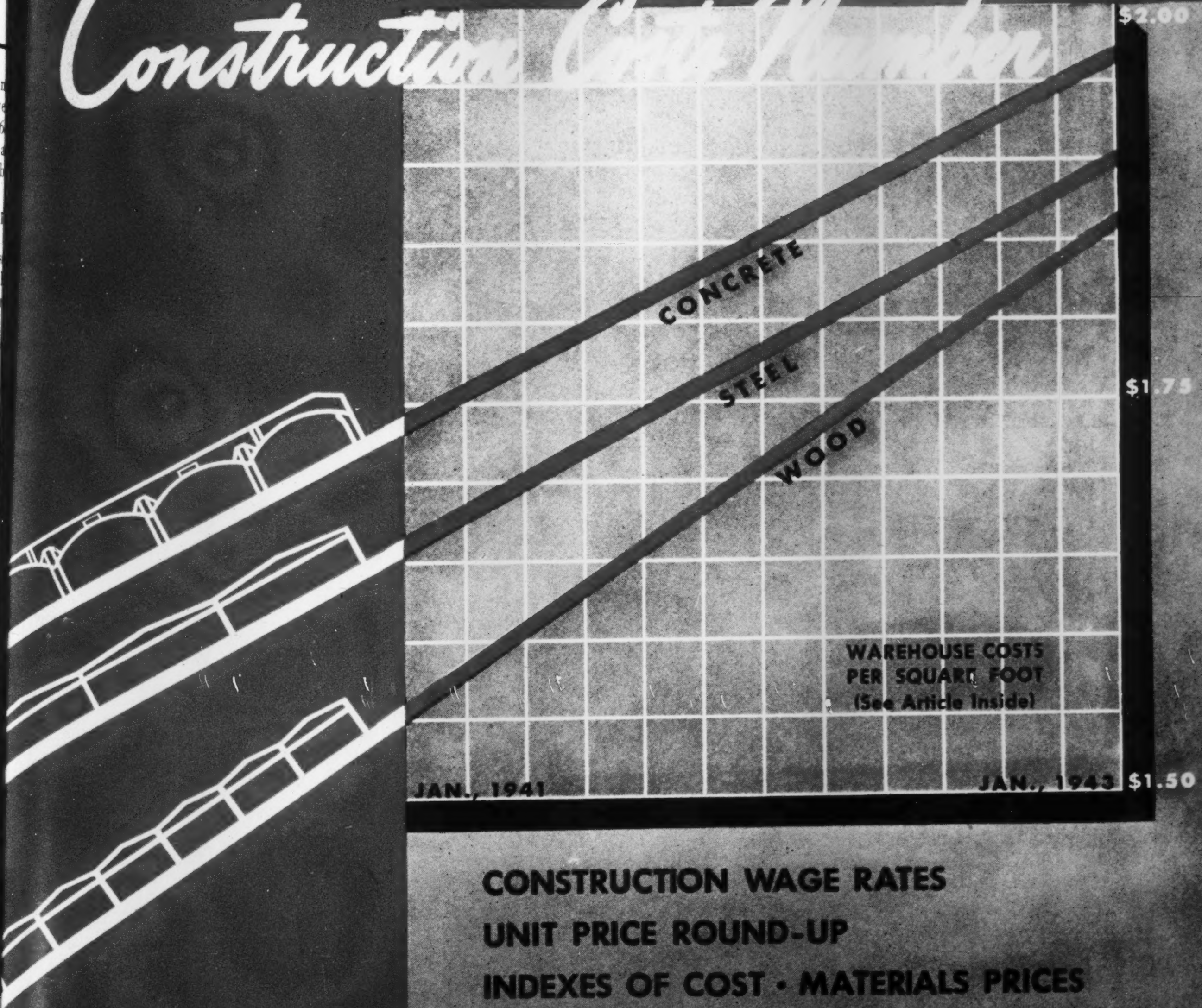
APR 27 1943

ENGINEERING NEWS-RECORD

APRIL 22, 1943

Construction Costs Number



WAREHOUSE COSTS
PER SQUARE FOOT
(See Article Inside)

CONSTRUCTION WAGE RATES
UNIT PRICE ROUND-UP
INDEXES OF COST · MATERIALS PRICES
EQUIPMENT RENTAL DATA
COMPENSATION INSURANCE

ISSUE - PRICE $2.00

It uses a

stream of wa

for an oar . . .

and

BYERS WROUGHT IRO

to fight corrosion

When the call comes for "Full speed ahead" on this Fire Boat (recently built for the Navy) the engineer opens a valve . . . and jets of water spurt from the stern below the waterline, speeding the vessel on its run.

With no propeller to foul, the boat can work in weed-choked shallow channels as easily as in open water. And only one power plant is needed; the same motors and pumps which propel the ship also fight the fire.

Impeller tubes must of course have a high degree of corrosion resistance, to withstand the vicious attack of salt water. They are Byers Wrought Iron. The same material is used for other piping.

This war has presented engineers with hundreds of new and different problems which they have solved with characteristic ingenuity and foresight. In many instances where corrosion or fatigue were service hazards, wrought iron has been the material chosen.

Because so much of the nation's heavy construction has been centered around the waterfront, wrought iron's performance in salt water service is particularly live news today.

One classic example is the service of wrought iron piles in San Francisco bay, where they were exposed to a six-foot tidal range for over 50 years. When the dock was abandoned, the piles were found in such excellent condition that they were reused, some for piles, and others for water supply lines. Commenting on this service, an engineering magazine wrote: "The significance . . . lies not only in their resistance to seawater but in their uniformity of corrosion. Lacking imperishability in a material, engineers can be well satis-
fied by a uniform and predicta
rate of deterioration. Knowle
of such quality enables them
build safely and economicall

The necessity of conserv
metal makes it imperative to
the most durable material availa
—and this leaves no margin
guess-work or experiment. If y
have any application where or
nary materials can't take it, o
Engineering Service Departme
will be glad to give you some
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installations. You will also fi
some interesting and helpful
formation in our technical bullet
"The Use of Wrought Iron
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COSTS YOU MORE THAN
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ENGINEERING NEWS-RECORD

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WALDO G. BOWMAN, *Editor* **ALBERT E. PAXTON, *Manager***

Vol. 130 APRIL 22, 1943 No. 16

COMING NEXT

• Since Pearl Harbor, literally hundreds of manufacturing plants have been erected in record time throughout the country—the construction industry's answer to the demands of war. One of the most interesting of these is a mid-west plant where U. S. Engineers used a combination of nonreinforced concrete and laminated timber, including 60-ft. roof beams, to save critical materials and speed construction. Design and construction features will be described.

• Tests to destruction with lateral loads on plywood of different thicknesses were made recently as a basis for tabulations of relative strength of joints using nails of various sizes. Materials and conditions of tests were made to conform closely to usual field practice. Results of these tests, will be included in the May 6 issue.

• In a new type of lavatory for cantonments in theater-of-operations, waste water is collected in tanks and used again for latrine flushing purposes. Wash troughs and urinals are made of split, vitrified tile, and latrine pits of concrete with wooden covers. Layout and operating design features are covered in an article to appear in *ENR* for May 6.

• Following up our recent coverage of unusual airbase drainage problems and how they were solved, an article—Multiple-Box Drains for Airbase Runoff—scheduled for May 6—is another worthy contribution to the data already published.

LOOKING AHEAD

• Plywood, a relatively new product to the building industry—currently being used as a substitute for critical steel and other materials—has made a place for itself that bespeaks a permanent demand. Its application for girder webs, form liners, wall sheathing, and many other wartime uses is now well known. How it is made is not so widely understood. In an early issue manufacturing procedure will be presented.

• In an article scheduled for early publication, data of five outstanding hydraulic engineers are compared and graphs made available that simplify calculations for determining the discharge over sharp-crested weirs.

PAGE

The Week's Events 51
Reader Comment 58
Editorials 60
Tower Derricks Erect Timber Blimp Hangar 62
Concrete Paving in Near-Zero Weather 67
Regional Planning Solves Many Wartime Problems 70
Waste Water Survey "Saves" Plant Capacity W. R. SCHNABEL .. 71
Widespread Need for Public Works Planning Imperative 73
Sanitary Fill Experience at San Francisco 74
Lift Pump Cleans Sewage-Disposal Grit Chambers 77
Bootstrap Jacking Rigs Raise Bridge 78
Strength Of Steel Anchors in Concrete HARRY E. GRAHAM 80
Asphalt Paving on 2 to 1 Slope 81
TVA Saves Steel with Cantilever Forms JOSEF C. PATCHEN 82
War and Postwar Waterworks Needs 84
From Field and Office 85
Construction Cost Section 89
News of the Week 235
New Aids to the Constructor 246
Manufacturers' Activities 258
New Trade Publications 262
Men and Jobs 266
Meetings 270
Construction Reports 275

Number of copies of this issue printed: 36,094

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To ....

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# LIGHT
FROM
FLOORS
brings 20%
more light

A light-colored concrete floor made with Atlas *White* portland cement reflects more light than a floor made with *gray* portland cement and very much more than a floor made with still darker materials. Installations in aircraft plants for Boeing, Consolidated, Douglas and North American prove this. Extensive lighting tests show that a white-cement floor, compared with a gray-cement floor in the same plant—

- ▶ ***Provides 20% more light on vertical work surfaces (see illustration);***
- ▶ ***Reflects 61% more light to underside work surfaces.***

These increases in illumination sharpen vision, reduce accidents, decrease spoilage, increase production.

Concrete floors made with Atlas *White* portland cement have the same characteristics, including durability, as concrete floors made with gray portland cement. In addition, they are light in color.

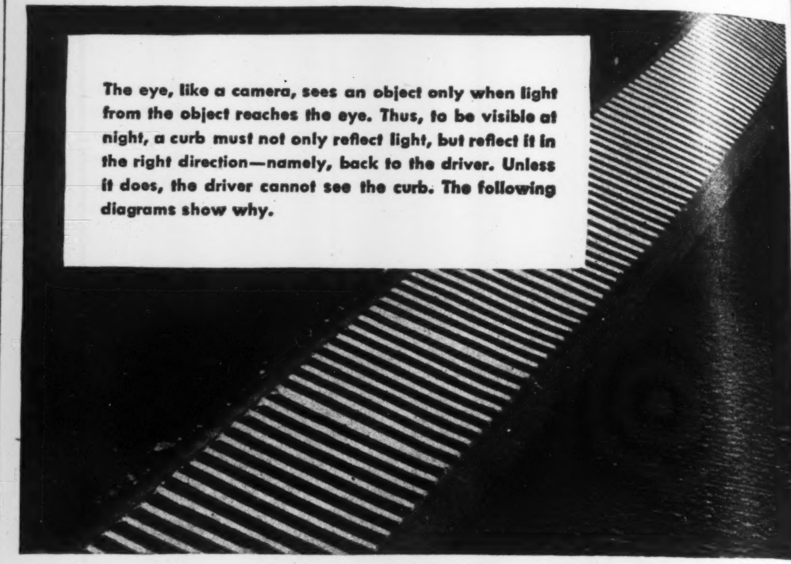
Maintenance is simple—frequent sweeping, occasional damp mopping, periodic scrubbing.

Send for new book, "Light from Floors." Write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

ENR

ATLAS
WHITE CEMENT
For Light-Reflecting Floors.

SAFER HIGHWAYS



The eye, like a camera, sees an object only when light from the object reaches the eye. Thus, to be visible at night, a curb must not only reflect light, but reflect it in the right direction—namely, back to the driver. Unless it does, the driver cannot see the curb. The following diagrams show why.

When the headlight rays of an automobile strike a mirror-like surface at a flat angle, the light is wasted because it is reflected forward, away from the source. The driver sees nothing.

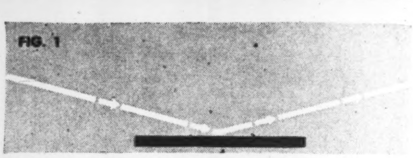


FIG. 1

When headlights strike smooth, dry concrete curb, most of the light is wasted. It is scattered forward and upward—away from the driver. Visibility is poor. (For emphasis, surface texture of concrete is exaggerated.)

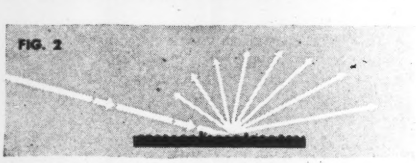


FIG. 2

On rainy nights, water fills minor depressions of concrete curb, making it like a mirror (as in Figure 1). Headlight rays striking it are reflected forward and upward, away from the driver. Visibility is almost nil.

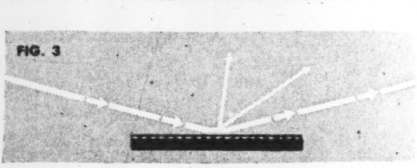


FIG. 3

But when headlights strike the sawtooth surface of a White Concrete Reflecting Curb, the light is conserved—it is reflected back to the driver. On dry nights the curb is bright; on wet nights it is brighter still.

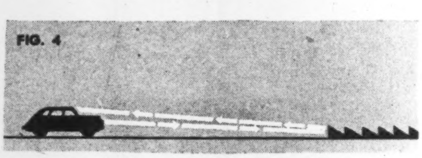


FIG. 4

● Day or night, dry or wet, White Concrete Reflecting Curb made with Atlas White portland cement provides a bright guide to safety. For the complete story see the new book, "A White Guide to Safety." Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Bldg., N.Y.

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ENR-M-35

ATLAS WHITE CEMENT
for white concrete reflecting curb

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • APRIL 22, 1943 • VOLUME 130 • NUMBER 16

WMC's new job change order will benefit construction

Order prohibiting shifting of jobs to get higher pay will tend to keep construction workers from seeking employment in factories

Construction should benefit from the War Manpower Commission's order forbidding workers to leave work in essential industries to take a job at higher pay. In the past, construction wage rates have been among the highest in industry, and when any raiding was done, construction contractors profited rather than lost by it. This is a major reason why the industry was able to get through the peak period of last year without any serious labor shortage. In recent months, however, factory wage rates in many places have overtaken the rates for common labor on construction, and contractors are encountering serious shortages of common labor in such areas as Detroit, Utah, Nebraska, and Indiana. This has gone so far that in some cases skilled men, at skilled pay, are doing laborers' work; bricklayers, for instance, carry their own brick.

In this situation, the new order can be helpful to the extent that it proves enforceable. The Manpower Commission's new order draws its authority from a price-control law—the Stabilization Act of 1942. It puts into effect a clause in the President's "hold-the-line" executive order of two weeks ago.

Effect of the order

The WMC order falls into two parts. In areas where one of the WMC's local labor stabilization programs is in effect, it does not greatly change present procedures since it permits any job shift which is authorized under the stabilization program. What the order does in this case is to put the statutory penalties of the Stabilization Act behind the local labor stabilization programs. These penalties are a year in jail or $1,000 fine; also, an employer who violates the regulation may be forbidden to deduct wages paid the man illegally hired as a cost in figuring his income tax. The penalties apply both to employer and employee.

Outside the stabilization areas, the order permits anyone to leave a nonessential job. A man who has been working in one of the designated essential industries during the preceding 30 days, however, may not take a new job if it carries a higher rate of pay. Nor may an employer hire a man at higher pay who has worked at an essential job during the past 30 days. Any worker who has been discharged, laid off for more than seven days, or can prove that he is working below his highest skill, may demand from his employer a "statement of availability" which will exempt him.

Enforcement of the order obviously will be difficult. For one thing, it relates only to raiding by the use of higher pay rates. There is nothing to prevent raiding based on a promise of more overtime work, of special bonuses such as payment of transportation charges, and the like. The 30-day clause also is a loophole. If a worker chooses to claim that he has been unemployed for the past 30 days, there is no way for his new employer to check up—particularly if he's not anxious to check.

It is still too early to tell how the 48-hour week order which became effective the first of this month will affect construction. In some areas, a tendency is developing to exempt construction, or at least defer application of the order to construction, on the ground that the industry is already working the longest practicable hours.

The difficult question of who shall bear the cost of overtime work on a fixed-price contract undoubtedly will have to be settled job by job. On government work, the policy which seems to be shaping up is for the owner to meet the cost if the contractor can prove that his original estimates on the job were based on a 40-hour week.

Inductees enlist as Army Engineer specialists

Lt. Col. Ralph Eberlin of the North Atlantic Division, Corps of Engineers, New York City, accepts Calvin Prince, World War veteran, and Herman W. Bergmann as the first voluntary inductees to enlist in the Army Engineers under the new recruiting program launched last week. (ENR, April 15, p. 519).

Under this plan of enlisting 9,000 specialists a month, trained equipment operators and technicians who have been working as civilians on engineering and construction projects may, prior to their induction by Selective Service, volunteer for enlistment with the Engineers. All men over the age of 18 who qualify for any one of the 75 listed technical occupations will be accepted as enlisted specialists.

Three-billion-dollar road program now before both houses of Congress

New bills set up fund of one billion for allocation to the states in each of first three years following the end of the war

Immediate authorization of three billion dollars worth of federal aid to highways after the war—proposed last month by the American Association of State Highway Officials and the American Road Builders' Association (*ENR*, March 11, p. 338, and March 25, p. 407) is provided for in identical bills now before the Senate and House road committees. No immediate action is contemplated on the legislation, but the bills have strong sponsorship. The Senate version was introduced by Senator McKellar, chairman of the road committee and one of the most powerful men in the chamber, the other by Representative Robinson of Utah, a member of the roads committee.

To be supplemented by states

The bill would authorize distribution to the states of $3,000,000,000 at a billion a year for the first three years after the war. It would be distributed on a 75-25 sharing basis with the states. Half of it would be spent on federal-aid roads, and the remainder would be apportioned equally between urban and secondary rural roads.

It is a peculiarity of highway legislation that authorizations such as this are regarded as binding on the federal government. Thus, if the present bill should pass, the states could immediately begin with assurance to plan for expenditure of the money. Moreover, the bill provides that, with permission of the Public Roads Administration, states may make expenditures now for the advance design and for the acquisition of rights-of-way, for which expenditures they will be reimbursed when the money is appropriated.

Interregional highway system

The bill requires the states of each of the geographic regions into which this country is divided by the Bureau of the Census to designate the roads that shall form an Interregional Highway System not to exceed 40,000 miles. The roads so designated are to be "so located as to connect by routes, as direct as practical, the principal metropolitan areas, cities, and industrial centers of each geographic region of the United States with metropolitan areas, cities and industrial centers of like importance in all other geographic regions and to connect at suitable border points with routes of continental importance in Canada and Mexico." Routes selected shall be subject to review by the Public Roads Administration with a view to making necessary adjustments at the boundaries of the geographic regions. All such routes as finally selected that are not now part of the federal-aid highway system are to be added to that system.

Off-street parking

Where states have permanently prohibited parking on roads and streets that are under their control, funds authorized under the proposed act can be used to acquire land for off-street parking areas and to build such parking lots. Similarly, the funds may be used to purchase land and to construct "highway facilities to give access to and between transportation terminals."

• • •

New building safety code urged in Massachusetts

The committee appointed by Governor Saltonstall of Massachusetts to assemble information for the assistance of the legislature in considering revision of laws pertaining to the safety of places of public assembly, following the disastrous night club fire in Boston, has rendered a report which both emphasizes a serious situation and makes recommendations for its improvement. The committee found an "overwhelming number" of hazards in buildings where people assemble, a confused but fairly adequate system of state and municipal laws and regulations dealing with such buildings, a general apathy on the part of the public toward its own safety, a Department of Public Safety seriously understaffed for inspection, and a lack of complete coordination between state and municipal enforcement bodies.

The committee makes three recommendations of which the first is the most fundamental, namely, a revision of present law covering the design, construction, maintenance and occupancy of buildings, so that it would become a safety code that would be mandatory for every town and city. Under such a law, power would also be given to the state commissioner of public safety, subject to the approval of the Board of Standards and Appeals, to issue such instructions regarding the acceptability of current standards of engineering practice as would be required to keep the safety code up to date regarding changing methods, materials and conditions.

The second recommendation relates to an improved Department of Public Safety. The commissioner would be appointed by the governor and council, as at present, and would have power to appoint and discharge his deputies subject to the approval of the governor. Employees would be under Civil Service regulations. The chief of the Division of Inspection would employ supervisors and assign them to the various districts throughout the commonwealth to inspect all boilers and to have supervision over municipal officers who would make the inspection of all buildings where 100 or more people can congregate or assemble. The officers of a city or town would be responsible for the enforcement within its territory of the requirements of the code and would be punishable for negligence. In effect, they would be under the orders and control of the state commissioner of public safety.

Finally, a campaign is recommended to advise the public of the legislative and administrative programs and secure the cooperation of public planning authorities, federal, state and municipal, toward the fuller accomplishment of public safety measures, especially the removal of hazardous buildings in blighted areas. The report points out that new buildings present very little difficulty but that the big problem rests with the mass of old buildings continuing in use without structural alteration.

William Roger Greeley, architect, Boston, was chairman of the committee whose members consisted of Morton C. Tuttle, head of the construction company bearing his name; Dudley Harmon, executive vice-president of the New England Council, Lt. Comdr. E. P. Knight, former superintendent of engineering department, Employers Liability Insurance Corp. and Lt. Paul V. Heddon, formerly of the New England Council.

• • •

Ohio highway department to keep estimates secret

Now pending in the Ohio legislature is a bill that would permit the highway department to withhold engineers' estimates on highway construction projects until after bids have been opened. This would repeal the present law requiring such estimates to be made public in advance of the bidding. Supporting his contention that Ohio needs such a law, Hal G. Sours, director of the highway department, has presented a report to the legislature covering a nation-wide survey recently completed by the department showing the procedure followed by other states in matters of this kind. In this nation-wide survey it was found that of the 46 states reporting, only one of them (New York) publishes estimates of projects, or otherwise makes them public prior to the date of letting. A number of the states reporting indicated that they do not expose the estimates even after the bids are taken.

Texas Section, A.S.C.E. acts as host to national board and section delegates

Problems now before civil engineers and construction men take up a large part of meetings held in Dallas, April 6-8

A large number of engineers from many parts of Texas met in Dallas April 6-8 for discussion of both national and local questions, chiefly those raised by war conditions. The occasion was the spring meeting of the Texas Section, American Society of Civil Engineers, which had been timed to coincide with the spring meeting of the board of direction of the society and a conference of representatives from other local sections.

The Dallas Branch of the society and the Dallas Technical Club also participated in the joint meeting, holding luncheon sessions to which the out-of-town visitors were invited.

Decline in construction

The effect of the decline in construction on civil engineers and on the construction industry was the subject of extended discussion by the board of direction and also by a group of Texas engineers and contractors, at which latter meeting Hal H. Hale, Washington representative of the A. S. C. E., spoke. The board discussed at length the need for postwar planning, both as a means for avoiding a depression following the war and as a source of useful employment for engineers not engaged in the war effort.

Acting on a request from the construction division of the society, the board authorized the appointment of a committee to promote postwar planning by both public and private agencies. In this connection, it decided to explore further the possibility of affiliation with the Committee for Economic Development, which is directing its attention to determining the ways in which private industry can contribute most to postwar reconstruction. John F. Seifried, president of the Illinois Section, spoke at the section conference on the outlook for civil engineers after the war.

Local sections' conference

The need for postwar planning also was the subject of a talk by Ezra B. Whitman, president of the society, before the local sections' conference. At the Texas Section meeting on April 8, Dean W. R. Woolrich of the University of Texas lead a discussion of the same subject. Howard F. Peckworth, assistant to the secretary, reviewed employment conditions for engineers at the meeting; at the local sections' conference he reported on his work in connection with employer-employee relations among engineers, chiefly on war contracts. Also considered at the conference was the question of whether the engineering profession should be restrictive, discussion being led by S. J. Callahan of the Kansas City Section.

Airfield construction

The technical session of the Texas Section meeting was devoted to discussion of various aspects of soil compaction, including work of the Army engineers on airfield construction, speakers being Thomas E. Stanton, California Division of Highways, Maj. Frank H. Newman, Capt. Horace S. Kerr, and Prof. Raymond F. Dawson of the University of Texas.

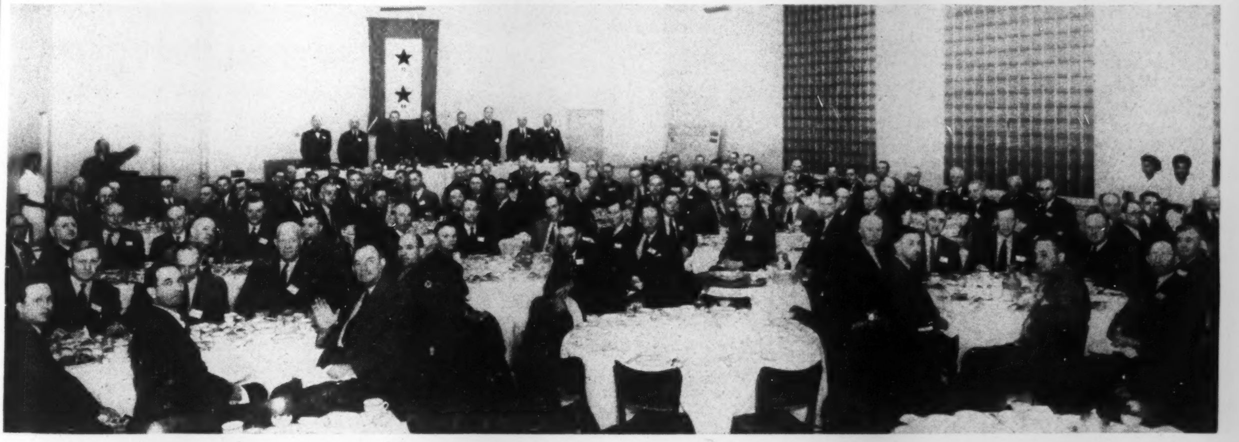
Steel code approved

Reversing action taken at its January meeting, the board of direction gave its approval to the American Standard Building Code Requirements for Structural Steel (Riveted, Bolted or Welded Construction) of the American Standards Association.

At the January meeting the board, on advice from the society's structural division, had not approved the code for riveted and bolted construction because the division held that the recent emergency specifications of the War Production Board would probably result in a further revision of the proposed standards after the war. However, the society's representatives on the A. S. A. committee urged that the code requirements (which now include welded construction) be approved despite the possibility of further changes as a result of experience with the WPB requirements.

To meet in Los Angeles

The board of direction voted to consolidate the annual convention of the society with a meeting of the Los Angeles Section to be held sometime in July in order to comply with the society's requirement for such a convention without placing any extra load on the nation's transportation system. It is expected that other than the board, the only members to attend the convention will be those who can come to it by local means of transportation.



The Dallas Branch of the Texas Section, A. S. C. E. was host to the board of direction of the society and to delegates to the local sections conference held in Dallas April 7. Edward F. Maddox, president of the branch, presided. Speakers were Lt. Comdr. G. E. Geyer and Col. Julian C. Hyer. Guests at the head table included Ezra B. Whitman, president of the society, and John H. Bringhurst, president of the Texas Section.

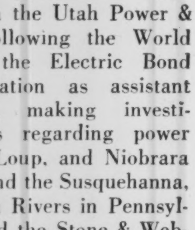
Parker leaves TVA to Head M.I.T. Engineering Dept.

Theodore B. Parker, chief engineer of the Tennessee Valley Authority, will leave the TVA on June 15 to join the faculty of the Massachusetts Institute of Technology as head of the Department of Civil and Sanitary Engineering. Subject to suitable arrangements with M.I.T., the TVA will retain Mr. Parker for consultation on major engineering problems. At the same time the TVA Board announces that Clarence E. Blee, project manager at Fontana Dam, will succeed Mr. Parker as chief engineer and that Robert A. Monroe, assistant to the chief engineer, will be named assistant chief engineer.

Mr. Parker was graduated at M.I.T. in 1911 and later from the U. S. Army Engineers School. He served overseas with the engineers in World War I. Mr. Parker began his long period of specialization in hydroelectric development in 1912 with the Utah Power & Light Company. Following the World War, he rejoined the Electric Bond and Share organization as assistant hydraulic engineer, making investigations and reports regarding power sites on the Platte, Loup, and Niobrara Rivers in Nebraska and the Susquehanna, Delaware and Lehigh Rivers in Pennsylvania. Later he joined the Stone & Webster Engineering Corporation as hydraulic engineer and was connected with investigations, studies and designs for various hydroelectric developments, particularly Bartlett's Ferry in Georgia and Rock Island development on the Columbia River in Washington.

Mr. Parker came to TVA in 1935 as chief construction engineer. Prior to that he was acting state director of PWA in Massachusetts. In 1938 he was made TVA's chief engineer.

Blee Succeeds Parker



Mr. Blee, who will succeed Mr. Parker as chief engineer, is a native of California and was graduated from Stanford University in 1911. After many years on hydroelectric and water supply projects on the Pacific Coast, particularly with the British Columbia Electric Railway Company, he joined the TVA in 1935 as principal hydraulic engineer. When Hiwassee Dam was authorized, he was made project manager and more recently has been project manager at Fort Loudoun Dam.

• • •

Steel bridge competition discontinued for duration

Owing to conditions brought about by the war, the American Institute of Steel Construction has decided that, for the duration of the war, no awards will be made in their annual bridge competition. These awards have been made annually since 1938 for the most beautiful large, medium-sized, small and movable bridges constructed during the previous year. Awards have been made by juries selected from nationally-known architects and engineers. As some bridges have been, and will be, built since 1941, the period covered by the last competition held, the A.I.S.C. will reinstate these awards after the war and the structures then eligible to compete will include all those steel bridges constructed since Jan. 1, 1942.

Sewer and water line extensions in Maryland

A bond issue of $700,000 by the Was ington Suburban Sanitary Commissio was authorized recently by the Publi Service Commission for construction an extension of water and sewer lines new suburban settlements in Montgomery and Prince Georges counties i western Maryland. Harry R. Hall, chie engineer for the Sanitary Commission states that the total cost of the projec will be $934,000 and it is expected to b completed within six months. These ne waterworks extensions are for new se tlements completed recently as a resul of over-crowded conditions in the capita city. Many of these homes are now completed except for installation of thes "essential services." According to Mr Hall the Sanitary Commission alread has on hand a large supply of equipmen needed in constructing water and sewe lines and has made arrangements to obtain certain priorities to enable it t carry on the work.

JOBS OF THE WEEK

FUEL STORAGE FACILITIES, Virginia
Bureau of Yards & Docks, Navy Dept., Washington, D. C., awarded contract for additional fuel storage facilities, at Craney Island, Kingman and Ballard Estates, to McLean Contracting Co., Baltimore, Md. Estimated cost is $2,350,000.

ADDITIONAL FACILITIES, Hastings, Neb.
Maxon Construction Co., Dayton, O., has been awarded contract for additional facilities by Bureau of Yards & Docks, Navy Dept., Washington, D. C. Cost will be $8,635,000.

ADDITIONAL FACILITIES, Pleasanton, Calif.
Bureau of Yards & Docks, Navy Dept., Washington, D. C., has let contract for additional facilities to McNeil Construction Co., Los Angeles, at a cost of $11,972,524.

ADDITIONAL FACILITIES, Oakland, Calif.
Bureau of Yards & Docks, Navy Dept., Washington, D. C., will construct additional facilities, at Naval Air Station, to cost $1,540,000. Dinwiddie Construction Co., San Francisco, is contractor.

PAVEMENT FACILITIES, Georgia
U. S. Engineers Office, Savannah, Ga., will construct additional pavement facilities, Houston County. Contract awarded to William F. Bowe, Jr., Atlanta, Ga., at a cost between $500,000-$1,000,000.

PLANT, Connecticut
Vought-Sikorsky Division, United Aircraft Corp., Stratford, Conn., will alter two buildings for helicopter plant. Estimated cost is $500,000. Edwin Moos & Sons, Inc., Bridgeport, Conn., is contractor. Albert Kahn & Associates, engineers and architects.

DRY DOCKS, College Point, N. Y.
Yards & Docks, Navy Dept., Washington, D. C., awarded contract for five timber floating dry docks, to Ira S. Bushey & Son, Inc., Brooklyn, N. Y., at a cost of $3,635,000.

HEMP MILLS, Illinois, Iowa, Minnesota and Wisconsin
Department of Agriculture, Commodity Credit Corp., Hemp Div., Washington, D. C., received low bids for forty hemp mills from Brown & Mathews, New York, N. Y., at a cost of $4,637,000. For bids on individual mills see *Construction Report Section*, p. 275.

SHORE FACILITIES, Washington
Bureau of Yards & Docks, Navy Dept., Washington, D. C., awarded contract for shore facilities, to Austin Co., Cleveland, O. Estimated cost is $4,814,420.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 275

Shipbuilding ranks first in tonnage of steel used

The shipbuilding industry was the principal customer of the steel industry in 1942 for the first time in the annals of steel production, according to the American Iron and Steel Institute.

A total of 9,425,000 net tons of steel products was sent to shipbuilders for fabrication into vessels for the Navy and the merchant marine. This figure excluded several hundred thousand tons for construction of shipyards and ways, buildings and auxiliary equipment. The total used was nearly three and a half times the amount of steel delivered to shipyards in 1941, and was 16 percent of all steel shipped to consumers last year. Last December fully one out of every five tons of products moving out of steel plants went to the country's shipyards.

Shipments of steel for direct war purposes in 1942 could not be revealed separately so the institute grouped them mainly under the heading of miscellaneous industries and exports, a category that took 14,848,000 net tons of steel, or almost 25 percent of total shipments.

Second in rank of steel customers last year was the construction industry, which took 8,656,000 tons, or 14 percent of the total. The trend in this industry at the year-end was downward, reflecting the approaching completion of a large part of the war plant construction program. Jobbers, dealers and distributors were in third place, receiving 10 percent of all shipments. The railroad industry took 7 percent, container makers used 6 percent and makers of machinery and tools acquired 4 percent of the total steel manufactured last year.

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Pooling more equipment urged for roadbuilding

Pointing out that failure to fully utilize existing equipment for civilian roadbuilding will work hardships on all local governments undertaking roadbuilding and maintenance work, the War Production Board has strongly urged highway commissions which have not already done so to adopt the plan for pooling of road machinery and equipment (*ENR*, Mar. 4, p. 321) initiated by the government several weeks ago.

As the season for road construction and repair is drawing near, some commissioners are faced with the problem of obtaining necessary equipment. The problem is not the result of any lack of equipment; a survey of construction equipment owned by local governments shows there is enough such equipment within each state. The fault lies in inadequate use of the equipment, some of it being idle in one place when it is urgently needed elsewhere.

The proposed pooling plan is designed to remedy this, making all equipment available to local governments within each state. The plan was initiated to reduce requirements for road-building machinery used on the home front because practically all new road-building machinery is being channelled to the military. Though originating with the WPB, the plan is state-operated with a state official as coordinator. Responsibility is completely in the hands of the state. Twenty-one states, to date, have pooling plans in operation, and others will fall in line shortly.

Missouri River flood engulfs Omaha's airport

Floodwaters of the Missouri River, flowing through two breaks in the protective dikes on the northeastern outskirts of Omaha, Neb., April 12, extended over a 10 sq. mi. area, inundating the $4,000,000 municipal airport and causing damage to the industrial area of that city. The water was 4-ft. deep in the administration building at the airport.

Swollen by heavy rains and melting snows, the river reached a crest of 22.45 ft. at Omaha, which was the highest since 1881 when a crest of 23.8 ft. was recorded. Flood stage at Omaha is 19 ft.

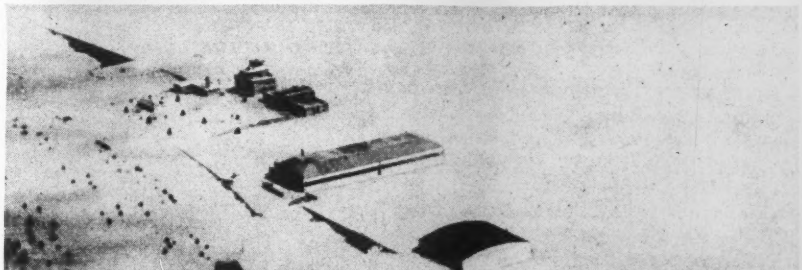
Damages from the flood conditions extended along a 200-mi. front from Sioux City on the north to Hamburg, Ia. on the south, although high water existed as far south as Kansas City. The village of Carter Lake, Ia., situated on low-lying land at Omaha was also inundated, with many houses being flooded up to their roofs.

The first break in the Omaha dike nearly caught some 900 workers off their guard. Apparently starting from a sandboil at the bottom of the dike, the breakthrough quickly enlarged to a 20-ft. opening and later extended to over 100 ft. wide.

Army Engineers and troops from Forts Crook and Omaha, highway departments, civilian workers and state guardsmen from Iowa and Nebraska aided in strengthening dikes along the endangered riverfront.

Considerable damage was suffered by highways and bridges. Lincoln highway traffic had to be rerouted through Omaha because of the washout of a large culvert. Two small bridges and a considerable section of U. S. Highway 30 near Missouri Valley, Ia., were swept away by the floodwaters, as was a small bridge on the Iowa approach to the Blair bridge.

At Hamburg, Ia., the Mose Givens dike failed under the tremendous water pressure causing heavy damage to the town, as a portion of it lies 11 ft. below normal river level.



Press Association, Inc.

Floodwaters covered the municipal airport at Omaha, Neb. to a depth of 4 ft.

Plate production drops after fake test charges

War Production Board officials are disturbed by a serious drop in the production of steel plate which has come as an aftermath of Truman Committee and Justice Department charges that Carnegie-Illinois Steel Corp. falsified tests on defective steel plate. Plate mills, it is believed, are now leaning over backward in the rigidity of their tests, with an inevitable and serious drop in output resulting.

In a telegram to the mills, Donald Nelson of WPB, urged avoidance of "over-rigid inspection practices." He pointed out that "naval architect's specifications are invariably drawn so as to leave an ample margin above the maximum stresses which are to be expected in actual service." It is necessary, he said, "that sober good judgment guide the entire testing and inspection process. . . . Let us avoid a blind, unthinking insistence on unattainable perfection."

Nelson has called meetings of Navy, Maritime Commission, and steel industry officials to decide what to do about the situation. The effect of Nelson's activities will be reduced by the Truman committee's announcement that it has no sympathy for Nelson's position except in visual tests that are based on judgment. Where definite tests exist, the committee holds, the specifications should be met; if the specifications are too high, they should be changed. The committee proposes to ask all steel firms whose April production drops "the extent of any slump in their production which they attribute to the requirement that they comply with government specifications."

Engineer Troops Cited for work on Alcan Road

Army units engaged in construction of the Alcan Highway from March to October, 1942, have been cited for meritorious conduct, the War Department has announced. The units cited are the 18th and 35th Engineer Combat Regiments, the 93rd, 95th, 97th, 340th and 341st Engineer General Service Regiments, with the 73rd and 74th Engineer Light Pontoon Companies, the 133rd, 134th, 140th and 141st Quartermaster Truck Companies, the 428th Engineer Dump Truck Company, Company D, 29th Engineer Topographic Battalion, Company A, 648th Engineer Topographic Battalion, and Sector Headquarters and attached Air Forces, Engineer, Medical, Ordnance, Quartermaster and Signal Corps Detachments. The citation states that the units "were charged with the task of constructing a 1,600-mile highway from Fort St. John, British Columbia, to Slana, Alaska, 'with all speed within the physical capacity of the troops.' The general route selected for the highway lay across vast areas of almost impenetrable wilderness, vaguely mapped.

"Commencing with the spring thaw and continuing on through the summer floods, the troops overcame the difficulties imposed by mountainous terrain, deep muskeg, torrential streams, heavy forests, and an ever lengthening supply line. By virtue of remarkable engineering ability, ingenious improvisations and unsurpassed devotion to duty, the units assigned to the highway construction completed their mission in one short working season and thereby opened a supply road to Alaska that is of inestimable strategic value."

Fleming to speak at road builders meeting

Brig. Gen. Philip B. Fleming, head o the Federal Works Agency, is to be th principal speaker at the annual meetin of the American Road Builders' Association to be held May 4-7 at the Edgewater Beach Hotel, Chicago. Othe speakers will be Thomas H. MacDonald chief of the Public Roads Administration, who will review current road programs, Frank W. Herring, assistant director of the National Resources Planning Board, who will discuss the place o highways in postwar planning, and Capt L. N. Moeller, director, progress contro and statistical department, Bureau o Yards and Docks, who will speak on th place of contractors' organizations an equipment in the Navy's program fo 1944. Members of the Senate and Hous roads committees also are expected t be present.

• • •

Irrigation dam in Mexico nearing completion stage

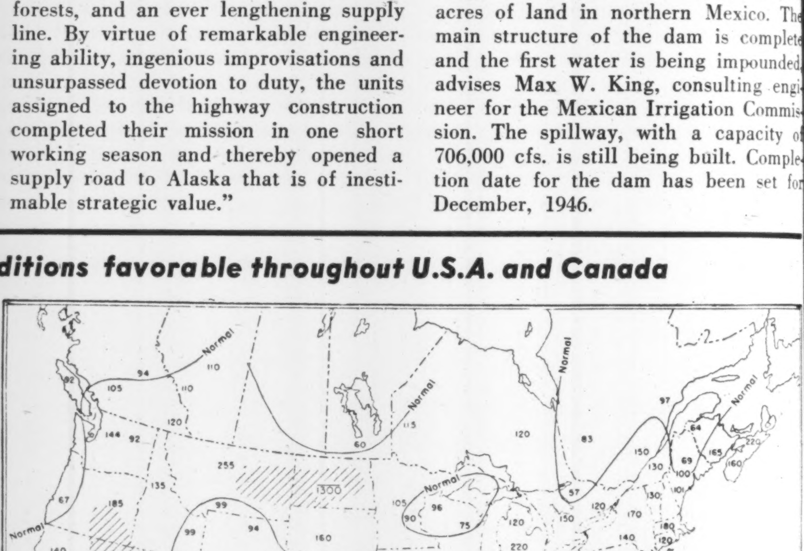
Located 75 miles southwest of th Texas Rio Grande Valley, constructio of the 4-mi. long earth-filled El Azuca Dam, on the San Juan river is proceeding according to schedule. This gravit irrigation project will serve 200,00 acres of land in northern Mexico. The main structure of the dam is complet and the first water is being impounded advises Max W. King, consulting engineer for the Mexican Irrigation Commission. The spillway, with a capacity o 706,000 cfs. is still being built. Completion date for the dam has been set fo December, 1946.

March water conditions favorable throughout U.S.A. and Canada

Surface and groundwater conditions continue favorable during March over most of the important industrial and power-producing areas of the United States and Canada, according to a report issued jointly by American and Canadian government agencies.

Continued deficiencies in precipitation in the central and southern plains, and in Arkansas and eastern Texas are steadily decreasing stream flows. Storage in underground reservoirs is normal to high in states along the Atlantic coast from Maine to South Carolina. Groundwater conditions continue favorable in the intermountain area and along the Pacific coast except Washington.

Floods have occurred in the lower Ohio River, the Gulf States, Oregon and northern Nevada. Melting snow caused destructive ice jams in Montana and the Dakotas; and the recent flood stage of the Missouri River at Omaha was within 1.5 ft. of the record high.


Normal
EXPLANATION
Deficient stream flow
Excessive stream flow
1300 Greater than any percentage previously recorded during March
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
IN COLLABORATION WITH
CANADA
DEPARTMENT OF MINES AND RESOURCES
DOMINION WATER AND POWER BUREAU
MARCH, 1943

All numbers are percent of normal (median or mid-value) stream flow for month of March

OBITUARY

, Gen. **Frederick H. Kisch,** 55, chief neer of the British 8th Army, died action in Tunisia early this month. eral Kisch had played an important in the North African campaign, ing been responsible for the fortitions at El Alamein and having adistered the engineering program ch enabled General Sir Bernard ntgomery to make his swift advance Tripoli. Born in Darjiling, East India, 1888, he was educated in England, ered the Royal Engineer Corps in 9 and fought through the first World r in France and Mesopotamia. He s awarded the Distinguished Service der and the Croix de Guerre.

hn J. Wilmore, 78, dean of the school engineering and director of the gineering experiment station at Alama Polytechnic Institute, at Auburn, a., died April 11. He had been a ember of the school faculty since 1888 d dean of the engineering school since 07. He was graduated from Purdue niversity in 1888.

hn Lincoln Hall, structural engineer Seattle, Wash., died there April 9. r. Hall designed the steel work on the etropolitan Life tower in New York ity, which at the time of its construcon was the tallest building in the orld, and the Concourse roof of the ennsylvania Railroad station in New ork City. He had practiced in Seattle nce 1909.

erry Donohue, 59, chairman of the Wisonsin highway commission from 1929 1931, died April 13. Mr. Donohue ad been a consulting engineer since 910 and president of the Jerry Donohue Engineering Co. since 1921.

. C. Evans, 55, former chief assistant ngineer of Nashville, Tenn., died there pril 6. He retired in 1934.

ames F. Weed, 76, of Beaumont, Tex., ivil engineer, oil operator and capitalist, ied April 14 at El Paso, Tex.

erbert L. Russell, 66, engineer, died pril 1 at Detroit. For many years Mr. ussell was a civil engineer for the rand Trunk Western R. R. and later onsulting engineer for the Detroit and Toledo Shore Line R. R.

J. G. W. Campbell, civil engineer with the Canadian Department of National Defence for Air, died at Halifax, N. S., March 31.

George L. Sickafoose, 80, who served as Stark County, Ohio, surveyor from 1891 to 1906, and who several years later was appointed superintendent of drainage ditches, died April 8, at his home in Canton, Ohio. He studied engineering at Ohio Northern University and upon graduation was elected surveyor of Stark County. Mr. Sickafoose retired ten years ago.

James Goudie, 62, city engineer of Ironwood, Mich., died there recently.

Alfred C. Bell, 72, former vice president and sales manager of the Wisconsin Bridge & Iron Co., Milwaukee, Wis., died at his home there recently. He was at one time associated with the Lafayette Bridge Co., Lafayette, Ind.

Horace Edward Reed, 36, assistant engineer for the state division of highways

News of the Week
Continued on p. 235

in the Redding, Calif., district, was killed April 14 in a train accident.

Thomas E. Lane, 68, former superintendent of the Nahant, Mass., water department and local health office, died at Nahant on April 15. He had been associated with the water department for 40 years.

Loran A. Kerr, 67, died April 1 at Cheraw, N. C. He was a civil engineer and in 1908 he headed the company that bought the Charlotte, Monroe and Columbia R. R. and undertook the development of several thousand acres of land in the McBee area of South Carolina.

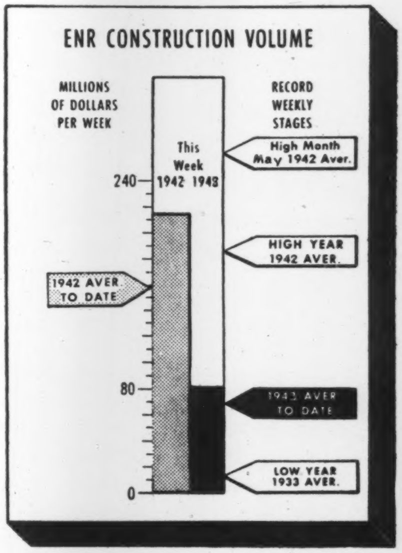
CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction in continental U. S. for the week totals $83,165,000. This volume, not including the construction by military combat engineers, American contracts outside the country, and shipbuilding, is 11 percent lower than a week ago, and 61 percent below the corresponding 1942 week. Private construction is 67 percent under last week, and 77 percent below last year. Public work declines 4 percent from the preceding week, and is 60 percent under a year ago.

The current week's construction brings 1943 volume to $1,171,009,000, an average of $73,188,000 for each of the sixteen weeks. On the weekly average basis, 1943 volume is 54 percent lower than the $2,709,514,000 reported for the seventeen-week period last year. Private construction, $123,147,000 is 46 percent below a year ago, and public work, $1,047,862,000, is down 55 percent when adjusted for the difference in the number of weeks.

In the classified construction groups, gains over last week are in bridges, industrial and public buildings, and earthwork and drainage. All classes of work are lower than in the 1942 week.

New capital for construction purposes for the week totals $699,000, and is made up of $571,000 in corporate security issues, and $128,000 in state and municipal bond sales. The week's new financing brings 1943 volume to $468,845,000, a total 80 percent below the $2,445,625,000 reported for the seventeen-week period last year.



Continental U. S. only—construction by military combat engineers, American contracts outside U. S., shipbuilding not included.

CONTRACTS

Continental U. S. Only
(Thousands of dollars)

	Week Ending Apr. 23 1942	Week Ending Apr. 15 1943	Week Ending Apr. 22 1943
Federal	$185,730	$73,258	$77,629
State & Municipal	12,981	9,251	1,920
Total public...	$198,711	$82,509	$79,549
Total private..	15,658	11,064	3,616
TOTAL	$214,369	$93,573	$83,165

Cumulative
1943.......(16 weeks).......$1,171,009
1942.......(17 weeks).......$2,709,514

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1942 17 weeks	Cumulative 1943 16 weeks
NON-FEDERAL ..	$220,670	$68,495
Corp. Securities.	71,414	2,821
State & Mun....	117,893	61,041
R.F.C. loans....	31,363	1,500
FPHA loans....	....	3,133
FEDERAL	$2,224,955	$400,350
TOTAL CAPITAL.	$2,445,625	$468,845

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost..	Apr. '43..	288.80	138.83
Building Cost.......	Apr. '43..	227.50	122.98
Volume	Mar. '43	228	100

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

New Logarithms Instructions

Sir: In reviewing many elementary mathematics books in the past several years I have been impressed (and disgusted) with the continued use of the out-of-date instructions relative to the determination of characteristics and the location of the decimal point from the characteristic when using logarithms.

Since the sole function of the characteristic is to position the decimal point why talk about "one less numerically than the number of digits to the left of the decimal point, and one greater than the number of zeros", etc.?

Neither is it clear to the beginner to say "count from (not including) the units figure." In this case he must count to the right and call it minus and to the left and call it plus. That is the reverse of the common use of plus and minus.

The instructions should state: "The mantissa (decimal portion) of the logarithm always gives a number between one and ten, hence a number with the decimal point to the right of the first digit. The characteristic indicates the actual position of the decimal point with respect to this initial position. That is, +3 shows that the decimal point in the anti-log is 3 places (3 moves) to the right from the initial position; —4 shows that it is 4 places to the left from the initial position. Of course zeros must be supplied when the point is more than one place to the left, i.e. when the characteristic is —2, —3, etc."

R. T. Brown,
Assistant Professor of Civil Engineering,
The University of Tennessee
Knoxville, Tenn.

The "Schenectady" failure

Sir: The break in the oil tanker, "Schenectady", at the Swan Island yard, while standing at the dock and after a trial run, has caused much discussion. This failure has been attributed to a number of causes, among which are the following: Shrinkage stresses in the welds; earthquake; silt collecting under the boat; a wind blowing from the side; and improper loading. The writer has not so far heard that it has been attributed to the machination of some perverse demon.

This failure is important because there is very little doubt that it is possible for the same failure to occur in many other ships. We, therefore, must evaluate what happened accurately.

Let us first consider the causes listed above. We can be sure that the so-called locked-up stresses of welding did not cause the break. These stresses obviously decrease continuously as soon as weld is cold. Such stresses would, of necessity, cause failure immediately, or not at all.

If improper loading would cause failure it certainly would not cause it at the dock,—it would have caused it when the ship was in a seaway during its trial trip.

We probably can also rule out the other suggestions which have been made, which are even more fatuous.

In arriving at the actual cause, the following fundamental fact should be considered. It is possible to have unequal expansion of the shell of the ship compared to its deck. Since the temperature of water is fairly constant compared to the air when the ship is in cold air, the shell is expanded compared to the deck thus putting a tensile stress on the deck which may be very great. For instance, a difference of 15 deg. F. between the shell and the deck will make a relative change of $\frac{3}{4}$ in. in the length of the deck and the shell of the ship. Normally the deck would stretch by this amount without further damage.

There are conditions which would not allow such a happy outcome. If there is an incipient tear started at the longitudinal center of the deck, then all the stretch will take place at this point. If there is an abrupt change of section of the deck, the same tendency will result. If the stretch forced by this unequal expansion takes place in this one point, rupture must result. This is obviously what happened in all the cases of all known failures.

Obviously, all ships so made are threatened with the same failure if all the same unhappy circumstances should take place. However, this can only occur when the temperature of the deck is relatively cooler than the temperature of the shell. Therefore, if the ship has gone through one winter without failure, the chances of its failing later are extremely remote.

There are three suggestions as to how the above possibility can be entirely eliminated. First, obviously, is to make the deck stronger relatively than the shell so the deck will bend the shell instead of the shell stretching the deck.

The second suggestion would be to put a wrinkle in the deck so that the pull mentioned will straighten out this wrinkle before it puts any great tensile stress on the deck.

Third, and this is more reasonable than the other two, is to put the deck under a sufficient compression at time of construction so that under any difference of temperature to which the ship will be exposed in service, the deck will not be put under a tensile stress which will approach its minimum strength at any point. This can easily be done when welding the deck together in the center section by wedging it apart at the time.

Of course, another obvious answer is after construction to expose the ship to maximum temperature difference between shell and deck, allowing it to break, which will relieve the stresses and then welding it up in that position. No further break could occur under this procedure. It seems, however, this would be a senseless approach to the solution.

J. F. Lincoln,
Cleveland, Ohio
Vice President, Lincoln Electric Co.

Lighting for a War Plant

Sir: In "War Plant with Glass Walls" in *ENR*, Feb. 25, 1943, p. 288, an error occurred in the description of the lighting system for the building. Reference to the lighting should have read "For artificial lighting all the floors are equipped with fluorescent units and, in general four 120-w. fixtures, each a bank of three 40-w. units, are used in each 22-ft. square bay. This arrangement is expected to result in an intensity of 35 foot-candles at floor level."

As published, the description listed the expected intensity at 45 foot-candles. Light measurements after the building was completed gave minimum and maximum values in a bay of 22 and 40 foot-candles, which the designers assume gives about 35 foot-candles as the average initial illumination.

L. G. Mertz, Jr.
Construction Engineer
Mergenthaler Linotype Co., Brooklyn, N. Y.

Sir: Referring to the article in *ENR*, Feb. 25, 1943, p. 288, entitled "War Plant with Glass Walls", a statement appeared to the effect that the lighting layout with four fluorescent units of 120-w. each for each 22-ft. square bay of building, resulted in an intensity of 45 foot-candles at floor level.

The writer wishes to point out that the above is a misprint. When the article first appeared, he contacted Mergenthaler Linotype Co. and was told that this figure, representing the anticipated foot-candles, was reported to an *ENR* editor by the plant engineer as 35 foot-candles and not 45 foot-candles.

For floor heights of 12 ft. 9 in., the writer is of the opinion that a correct average reading would be nearer 30 foot-candles than 35, but the plant engineer had bench height in mind in arriving at his figure.

Inasmuch as the error in the figures has caused comment in the profession, I trust this explanation will help clear up the matter.

A. E. Budell,
President, Industrial Engineering Co.
New York, N. Y.

Living in Hawaii

A letter addressed to "Our Friends on the Mainland" by F. D. Lowrey, president Lewers & Cooke, Inc., large lumber and building materials firm in Honolulu, was recently received, and because it contains so much of interest concerning conditions in the American territory that is nearest the war, parts of it are reproduced here.

With the thought that it may be of interest to our mainland friends, both personal and business, I will endeavor to relate briefly some of the highlights of our first eleven months on the "front line" of defense.

Everywhere there are men in uniform—and they are not on parade; barbed wire entanglements and defense posts surround principal buildings; splinter shelters fill our parks and available spaces downtown, while practically every private home has a small splinter shelter of its own.

We maintain blackout from 7:00 P. M. to 6:45 A. M. (War Time), and it is a real blackout, no half-way measures—no street lights, no electric signs and no lights in homes that are visible from outside. Citizen pedestrians (not aliens) may be on the streets until 10:00 P. M., and automobiles may move until 8:00 P. M. provided their lights are properly prepared to give off no light visible from above, but to serve only as a guide to the "other fellow."

Details of special interest

To get to some of the details which we hope may be of special interest:

On the morning of December 7 I was at breakfast with Mrs. Lowrey and our daughter, Mrs. Hamlin, when there came a telephone call that an explosion had occurred on the top floor of the Lewers & Cooke Building, which had set off our fire alarm gong. Knowing that there were a number of men in the building, I started down immediately. On the way down I noticed that there seemed to be an unusual amount of firing, but thought it was only extra strenuous maneuvers of which we had been having many.

An investigation showed that an anti-aircraft shell had gone through the roof and exploded on the third floor, cutting the sprinkler system. Fortunately, no one was hurt. While there was some damage caused by the shell fragments, much more was caused by water. It was mid-morning before we realized that we had undergone a Japanese attack, and even then we could not believe it.

It was indeed fortunate that on December 7 Lewers & Cooke had on hand one of the largest inventories in its 90 years of existence. Before noon on that day orders began rolling in from all branches of the services. Our crews worked day and night, and by April 1 our inventory had been reduced by 70%. Shipping was quite badly disorganized during January, February and March, and what materials did come in were emergency supplies for the Army and Navy. About February the Office of the Military Governor set up a priorities system for shipping, known as the Materials and Supplies Division, and by April materials were moving in as orderly a manner as could be expected under the difficulties of the convoy system. By this time many of our shelves were bare, and our lumber yard, except for the sills, resembled a baseball field on an off day.

All essential materials are now controlled by the Office of the Military Governor. In September over 80% of our sales of materials and services were made directly to the Army, the Navy, the O.C.D. or to contractors working for them. Other sales were really a part of war activity but not made directly to these agencies.

Military law, which was declared on December 7, has operated very well in general. The military governor called in several prominent civilians to advise and help him with the preparation of an organization to meet the emergency. Recently, the military governor and the civilian governor have agreed on the restoration of limited authority to the civilian courts. Depending wholly on the course of the war, we feel sure that there will be a gradual restoration of other civilian rights, but most of us agree that very definite military control is still needed. Under military law every person on the island, citizen and alien alike, over six years of age, has been registered, fingerprinted, immunized and furnished with a gas mask and identification card. We have our own currency, which is the regular currency overprinted with the word "Hawaii," and its use is restricted to the islands. All bonds and stock certificates, privately owned, are turned over to certain financial institutions for their safekeeping.

All in all, the community morale is good. We feel that American life is worth-while, worth working for and fighting for. In that spirit we will carry on until peace shall come and Hawaii once again be the Paradise of the Pacific.

F. D. Lowrey, President
Lewers & Cooke, Ltd.
Honolulu, Hawaii

Correction Note
San Vicente Dam

Sir: In the caption for the San Vincente Dam picture (*ENR*, March 25, p. 406) there appeared two typographical errors. In the third paragraph, the figure of 9.9 bbl. of cement per cu.yd. should have been 0.9 bbl. And in the last sentence of this paragraph, the concrete mixer production should have been 1,000 cu.yd., instead of 1,000,000.—*Editors*

EDITORIALS

VOLUME 130 NUMBER 16

April 22, 1943

Broadening the Background

APPOINTMENT OF T. B. PARKER, chief engineer of the Tennessee Valley Authority, to head the department of civil and sanitary engineering at Massachusetts Institute of Technology marks a departure from tradition that can be expected to be the subject of active discussion in engineering and educational circles. Our engineering schools have been widely criticized for turning out young engineers with little or no knowledge of the practical problems that they must face; and yet some of the same people who voice that criticism are free to condemn college professors for engaging in consulting work to broaden their own practical experience. If criticism of the engineering schools is justified, it finds its origin in the fact that the atmosphere of such schools, like any other institution of learning, has little in it of a practical nature. Probably this is inevitable. The experiment that the trustees of M. I. T. are making in bringing in as a department head an engineering executive with a broad practical background may be a partial answer. Certainly the addition of Mr. Parker's special abilities to those of the present teaching staff should put the school in an unusually advantageous position to meet the difficult days that are ahead for our engineering colleges.

Water Is Where You Find It

NOT A FEW MUNICIPALITIES today are in the position that Allentown, Pa., found itself a year and a half ago. Faced with increasing demands for water due to industrial expansion, these needs could be met only by enlarging supply facilities or possibly by eliminating leakage losses. Because of the difficulty involved in getting construction materials, Allentown decided that it would survey its distribution system to find "lost" water. The results, as described elsewhere in this issue, command the attention of those cities that need more water, and don't know where to get it. Through the discovery and elimination of underground leakage and leaks from fire hydrants and house services, Allentown has "found" three million gallons of water, representing about 15 percent of the daily pumpage. In wartime, this achievement represents a real contribution to victory; in peacetime, it will be recognized as a sound investment in operating efficiency.

Near-Zero Concrete Paving

DURING THE PAST WINTER, on a large airport in the Northwest, concrete pouring continued without interruption while the thermometer went down to within a few degrees of zero—far below temperatures heretofore considered practicable for laying paving exposed to the weather. Whether the additional cost for the protective measures against cold was 10 or 30 percent is unimportant—military expediency might make it imperative that the work be completed regardless of cost. The point is that a concrete paving job has been done at near-zero temperatures with results apparently as satisfactory as though air temperatures had been 60 deg. F., the concrete temperature objective in the preheating arrangements. Under peacetime conditions it is improbable that such a project would have been undertaken. In wartime it was a necessary venture. Resultant experience in the special measures required has developed much information that will be useful on later cold weather jobs. Thus, the emergency of war, in its pioneering, aids to advance peacetime practice.

War Economics

AN INTERESTING EXAMPLE of the present standard of values is a fire protection system that cost considerably more than the wood buildings comprising the properties to be protected. Under prewar standards it would have been better economy to risk letting the buildings burn than to spend more than their replacement cost for protection against a possible fire. In wartime, however they represent a combination of materials and labor whose importance far transcends any dollar value. Such economic theory is of course justified only in an emergency. It is not something that engineers can subscribe to in their everyday work.

A Decade on One Sanitary Fill

THERE IS NO SUBSTITUTE for experience. Because this axiom is particularly applicable to sanitary fill practice, the fact that San Francisco has just rounded out ten years of experience in disposing of "all household and commercial waste" at one spot, under the same management, and with even 75 percent of the same operating crew that started the fill a decade ago is an event to be noted. Experice on this project is valuable not only to other operators, but as a record of the fact that such s need not harbor rats and flies or even produce ious odors. Claims of objectors who fought s particular sanitary fill at the outset can now refuted, and this refutation helps elsewhere. may be argued that this fill is an exception cause it is fortunately situated with respect to habited areas and prevailing winds. However, se inspection of the fill reveals that odor and fly conditions are just those that are brought to the fill with the refuse—and no more. Each day's deposit is covered the same day, and the covered deposits quickly develop temperatures far too high for fly larvae or rats. The location admittedly is good, but something more than this is required where daily deliveries of some 650 tons of refuse are made in one spot without creating nuisance or worse. Major credit for this long and successful record goes to capable management.

PATRIOTISM AND POSTWAR PLANNING

HILE IT IS TRUE that postwar planning is no nger regarded as being in the class of unessential tivities that Pearl Harbor established, it is still r from being recognized as a part of the war fort. Unless it can be so recognized there of course little prospect of accomplishment ecause the necessary enthusiasm and drive will e lacking. One can accept the fact that postar planning for construction requires actual project design and not just talk of the world of the ture. One can admit that the initial tasks are to lear away legal restrictions, to make design funds vailable, to write specifications and even to purhase land. But it is very difficult to take action long these lines if there is a constant gnawing uspicion that it involves shirking essential war uties—in short, that postwar planning is somehow npatriotic.

How can this problem be resolved? What can e said in favor of regarding postwar designing as patriotic duty? One of the most significant hings that can be said is that military leaders o regard it. Recently, in speaking to a group of ivilian civil engineers, the head of one of the great ilitary construction services said the worry concerning jobs for his men when they are mustered ut is constantly with him. He was explicit in harging his listeners with the responsibility of aving construction ready to go when the war is ver. It was, he said, their patriotic duty.

From another angle, planning for peace is a ital part of total war. It must be carried on even hough major activity may be concentrated elsehere. Our military strategy now is to concentrate n Europe, but there is simultaneous planning—nd all the action that manpower and fighting facilities will permit—in the Pacific theatre. Similarly, even though major effort may be on war, the postwar front must be held and developed—with all the manpower and facilities that can be spared—pending the time when it will be the theatre of action. There is certainly no lack of patriotism on General McArthur's part in merely holding and developing his positions, and planning for the action that is to come. There is likewise nothing unpatriotic in planning for peace, even though the major job is presently elsewhere.

Patriotism is a state of mind, which may be induced by the emotions or developed by reasoning aided by willpower. As it applies to postwar planning it must be sought by the latter route. The consulting engineer who seeks a commission from a bank, an industrial company or a city has to convince himself that he is an important cog in the war machine. The highway engineer who appears before the legislature asking approval of a design program needs to feel that there is no reason for apology for his action. Likewise, the city engineer, the federal department head and the construction company official must be convinced of the essentiality of postwar designing and act accordingly.

The time has arrived when self-assertion on the question of patriotism and postwar planning will win both converts and supporters. Once all doubts are removed that planning for peacetime construction will injure the war effort—and military leaders assure us it will not—enthusiasm for the job will carry it forward. Here is a challenge that every engineer and construction man must meet and conquer in the privacy of his own thoughts. Only thus can project designing be characterized by action instead of continued purposeless procrastination.

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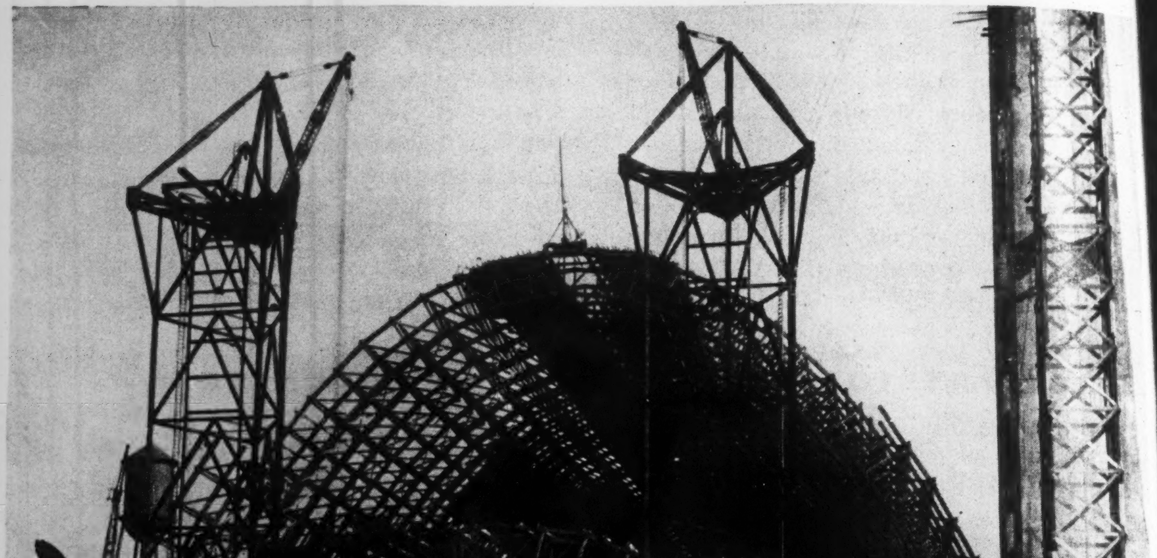


Fig. 1. Derricks, working together, lift crown section composed of two arches framed as a unit.

Two Traveling Tower Derricks Erect Huge Timber Blimp Hangar

Contents in Brief—*Methods and equipment used for steel erection were adapted to the construction of a 246-ft. span, 170-ft. high, 1,000-ft. long timber arch hangar for housing of blimps. Structural members are completely fabricated on the West Coast, fireproofed in transit and each arch truss assembled in four sections on the ground in front of the hangar. Two trusses are framed into a braced unit and placed together. Progress is 40 ft., two complete bays, per working day.*

STEEL ERECTOR's tower-mounted derricks are used to raise pre-assembled timber hangar sections for blimp housing at the Lakehurst, N. J., Naval Air Station. The hangars have a span of 246 ft. and a height above the ground of more than 170 ft. (*ENR*, Oct. 22, 1942, p. 576). The timber arch trusses are set 20 ft. c. to c., 51 of them being used to include a length of 1,000 ft. Overall measurements of the hangar are 1,058 ft. by 296.5 ft., the added length being taken up by door assemblies at both ends of the structure.

Timbers are preassembled on the ground into four sections for each arch truss. Two similar sections are framed into a "braced-bay" 20-ft. wide that forms the unit to be handled. The bottom section of the truss is eight panels long to panel point *8-i* and the top portion is the remaining ten panels to the centerline of the structure (Fig. 5). The bottom sections of the arches are set in place in braced pairs by the individual derricks. The top quarters are then joined on the ground by the two derricks working together and raised to a connection with the first erected part to form the complete ring.

Timber members for the arches are accurately precut to template in mills on the West Coast and are given a pressure-cylinder impregnation with chemicals to fireproof and preserve them. The fireproofed wood is required to stand a $\frac{3}{4}$-hour exposure to a standard time-temperature test in the wood is exposed to gas s of 1,300 deg. at ¼ hr., 1,550 t ½ hr., and 1,658 deg. at ¾ hr. ood will char at these temperabut will not support combustion.

Assembly at hangar site

a graded area in front of the r a preassembly yard is laid out. lly this is in two separate units, designed to assemble the mateor the trusses on one side of the rline. Central point of each asly layout is a guy-derrick with t. boom. Within reach of each ck are two assembly tables ard to accommodate one of the es designed for the bottom oneh of an arch ring and two tables russes for the top section.

e precut wood sections are ed at the assembly yard in deted piles and so arranged that piece is convenient to its place e truss. Layout tables are ared with all parts of the trusses ed to correspond to the precut bers so that use of drawings or ils in the field is eliminated. Memare placed loosely on the tables rings and shear connectors ind in the precut holes. A tight g jig is not necessary, as the es take their proper shape from mbly of the accurately cut and ed parts.

"post-office" system is followed olts and fittings, all parts for a icular panel point for one truss g put in a box marked for delivto the assembly table for use at joint. Joints are made up comely on the assembly table, long dled ratchet wrenches being used secure a rapid and uniformly ssed bolt connection.

Arch trusses on 20-ft. centers

rch trusses are spaced at 20-ft. o c. and are connected at each el point by a 3x12-in. purlin in plane of the top chord and by a sverse T-strut at the bottom chord. K-brace in line with the panel nts serves as a sway frame. Altere bays of the hangar have a system diagonal braces between adjacent ses in the plane of the bottom rds. For erection, the pair of sses that have the added bottom gonal system are assembled in the d and set up as a "braced-bay" t.

Two of the individually assembled gs are picked up by the derrick

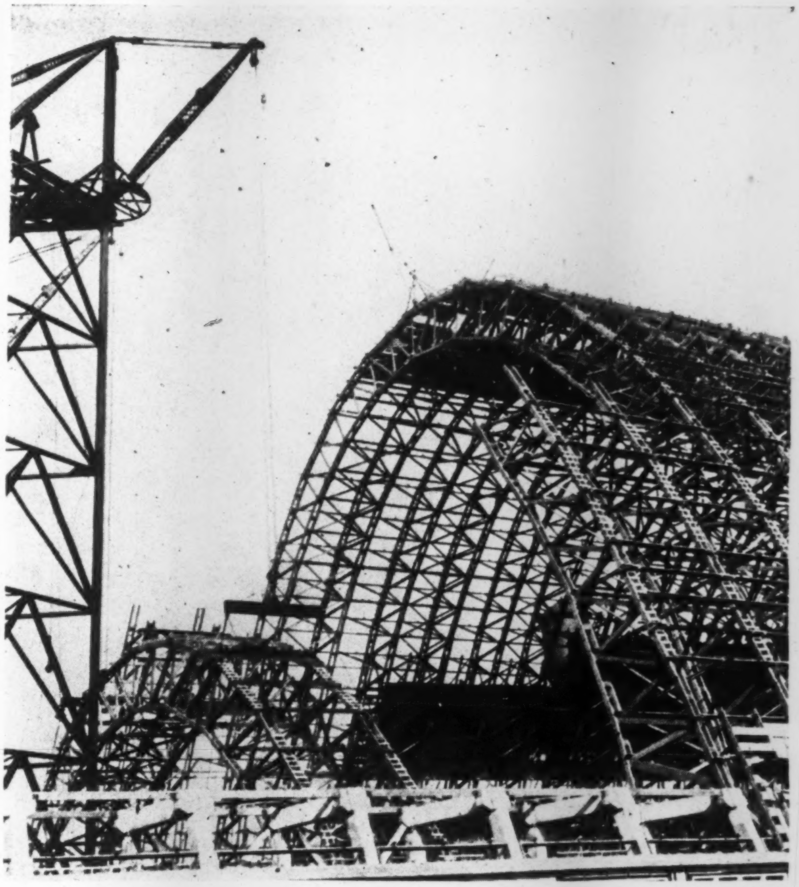


Fig. 2. Top half of a pair of arches ready to be lifted into position. Note that all bracing is completed in lower sections already placed.

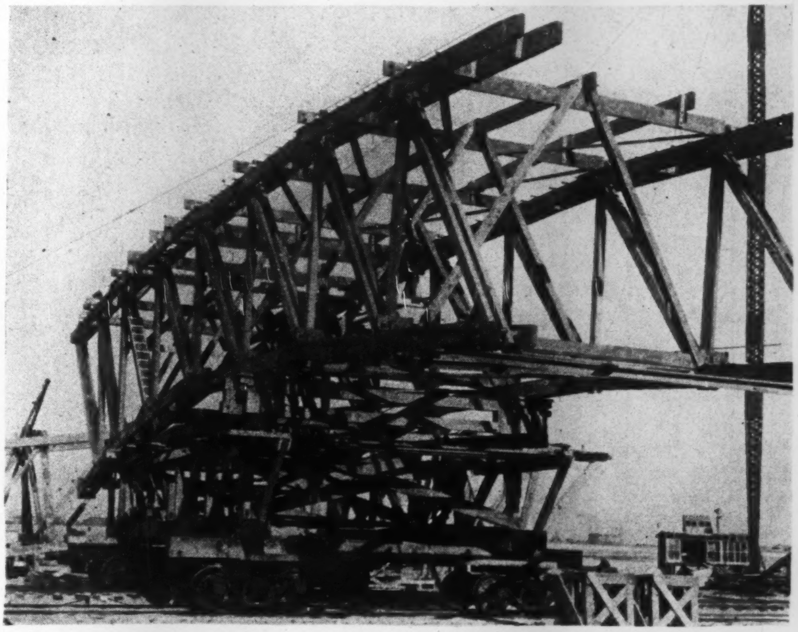


Fig. 3. Trusses are preassembled in sections, then moved to erection position on special frame on car trucks.

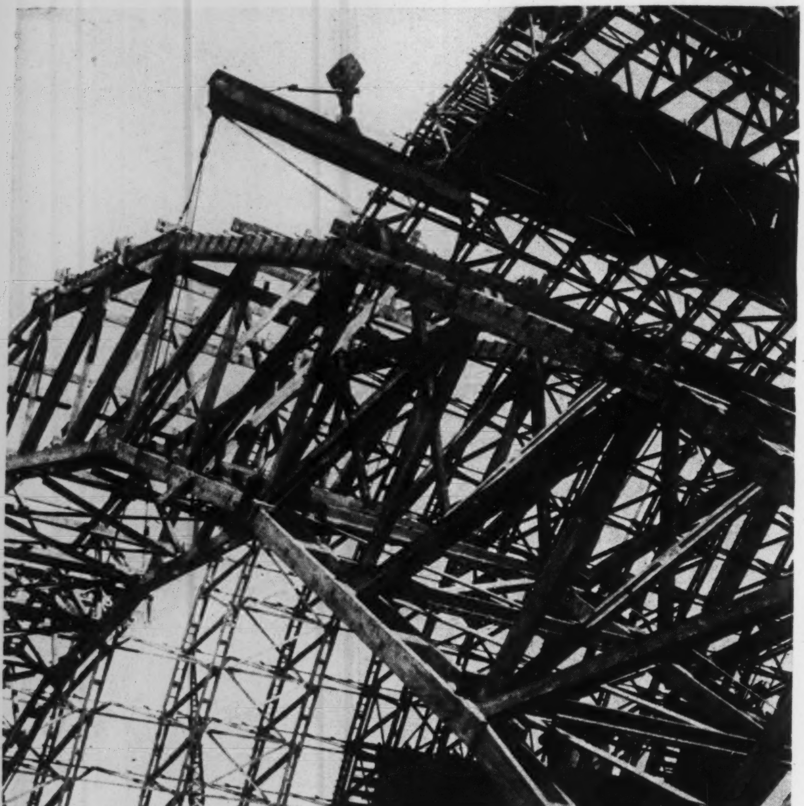


Fig. 4. Spreader to bring lift over each truss and special sling facilitate handling of truss without wracking.

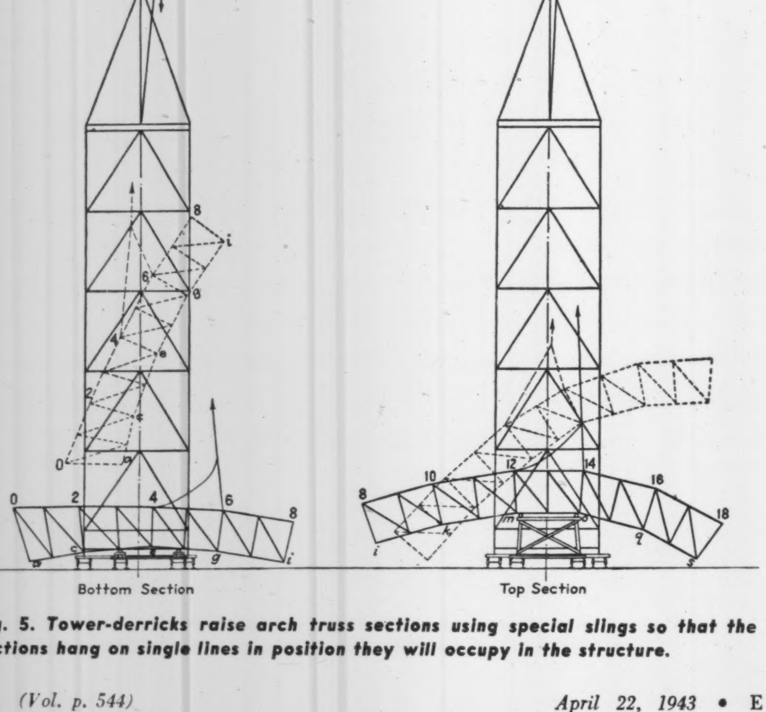


Fig. 5. Tower-derricks raise arch truss sections using special slings so that the sections hang on single lines in position they will occupy in the structure.

and set on edge in a timber frame that supports them at proper spacing while the interior braces are placed. This frame serves as a scaffold for the workmen assembling the truss and is open between the two trusses to permit a job made derrick, operating on standard rail-gage track, to move back and forth carrying previously assembled top purlins, K-brace, and bottom T-strut units into position.

In assembling the arch sections for erection the post, purlins and K-braces at panel point *8-i* are attached to the top one-fourth of the arch rather than the lower section. A rocker timber inserted at panel point *8* is framed into the joint to permit the end of the truss to be rocked over the ground, and to support the truss in assembly positions prior to erection of the member.

Completed sections of braced-bays are picked up from the assembly frame and set on a traveling platform, mounted on railroad car tracks, for transfer to the erection derricks.

Tower-mounted erection derricks

Prior to start of erection the concrete floor of the hangar was placed to provide a solid foundation for working and for support of the erection equipment. Rigid concrete bents, at the 20-ft. c. to c. truss spacing, adding 24 ft. to the height of the hangar, were placed in advance of the timber erection with anchor bolts set for connection of the timber trusses.

Erection of the preassembled arch sections is carried out by two stiff-leg derricks mounted on 145-ft. high triangular towers with booms facing the assembly areas. Each tower travels on four special trucks, similar but heavier than standard car trucks and of usual rail-gage.

Two sets of tracks, at 33 ft. c. to c., paralleling the center line of the hangar and 60 ft. on each side of it, permit movement of the towers as erection proceeds. Derrick booms are 75 ft. long and the rigs have a lifting capacity of 21 to 40 tons, depending upon the position of the boom and the radius at which it is working.

Erection started with the arches near the door support pylons at the assembly yard end; the erection equipment backing away as the erection proceeds. The arch sections are delivered to the derrick on the car-truck mounted frame on the same tracks that supports the erection tow-rs, the carriage being moved by nes from the erection-derrick hoist. There is no truss member between anel points *0-a* but an auxiliary ember is bolted across the bottom f the bearing plates prior to lifting he lower arch section from the car- iage. Lifting from the traveling car- iage is done with the main-fall from he derrick using a 20-ft. spreader to ive a direct lift over each truss. A pecial double sling to each truss at anel points *4* and *6* is so arranged hat it lifts the upper end of the truss from the car first, rotating the load over the reinforced bottom panel point *a*.

As the main fall is taken up, both lines of the double-sling come into action and bring the truss to the position that it occupies in the structure, with the bottom level, so that it can be readily attached to the top of the concrete bent. The auxiliary erection member from panel point *0-a* is then removed. The bottom section of the assembled braced-bay is ready for installation in the structure and is lifted by one of the derricks and set on the bents and bolted down. Preassembled transverse bracing, roof purlins, K-brace and the T-struts, are next placed between the pairs of preassembled trusses using a single line over a gooseneck extension on the big derrick for lifting. In this position the arch section is stable against wind, without cable ties, so long as the roof sheathing is not placed over it.

Erection of top section

The two top-quarters of a braced-bay section of the arch are next lifted from the transfer cars, one by each of the two derricks. These sections are picked up in a manner similar to that used on the lower section, rolling over the heel-block at point *i*. Again, specially arranged slings bring the two sections of the truss to a vertical position similar to that occupied in the finished structure and the top sections, panel point *18-s*, are brought together and the connection made so that the top half of the arch is assembled into one piece before being lifted into position. However, the top sections are of such height that this work is done some 75 ft. above the hangar floor. The top half of the arch is lifted to position by the two derricks working together and connections made to the already erected lower one-quarter sections of the arch.

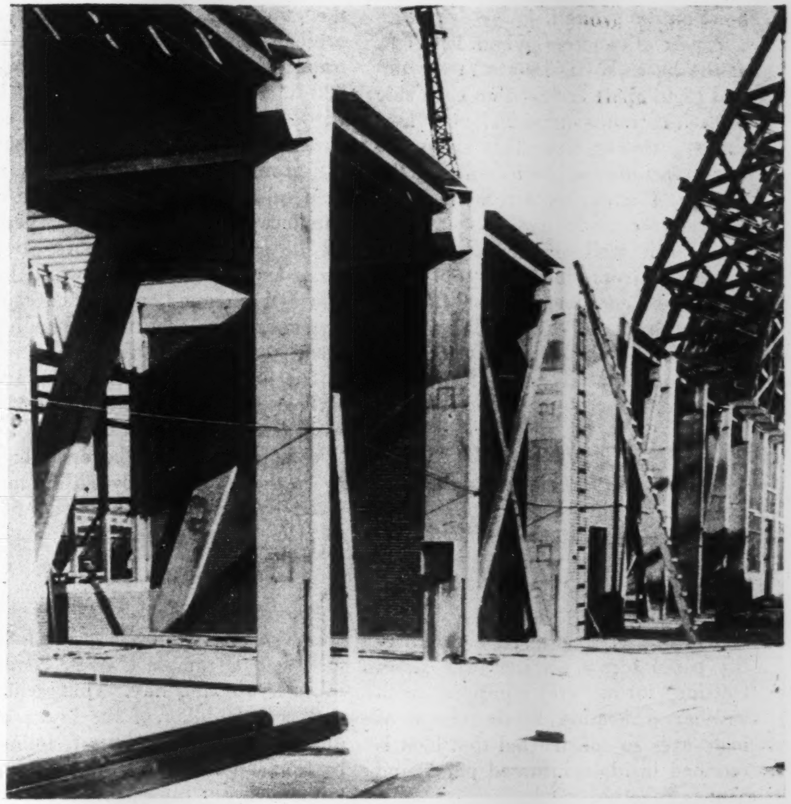


Fig. 6. Concrete bents extend 24 ft. above the floor giving more height and space to hangar. Offices and shops occupy the side space thus provided.

Before the load-falls are disconnected from the top section of the braced-bay, guy lines of $\frac{5}{8}$-in. wire rope are connected to the lower panel point *s* and extended at least 250 ft. both forward and back to an anchorage capable of sustaining a pull of 9,000 lb. Pairs of diagonal cables are placed at each twelfth truss until roof framing and sheathing has been completed.

Previously assembled bracing sections are fitted into the opening between the braced-bay just erected and the previously completed trusses. The auxiliary line on the big derrick is used for part of this handling; a small job-built derrick is used to place the three sets of bracing on either side of the centerline. This rig is skidded over the top of the roof trusses and is powered by a pneumatic hoist. Use of the small derrick permits early release of the major lifting equipment for handling the heavy loads.

None of the roof is placed until the complete arch ring is bolted up, thus keeping the surface exposed to wind forces during construction relatively low. Roof purlins are placed at every top panel point with 3x12-in. rafters at 6 ft. 8 in. c. to c.

The sheathing, which is 2 in. thick D&CM, is laid horizontally at right angles to the arches. It is fireproofed in random lengths and delivered by truck from a nearby treating plant.

Rafters placed by sliding scaffold

The rafters and the sheathing are placed from a sliding scaffold that is drawn up the sloping roof by hand winches. This scaffold has a frame around the outside edge for protection of the workmen. Above each of the skylight openings a walkway is maintained during construction; this is expected to catch material falling from the roof and to serve as a safety stop if a person working on the roof should slip.

Much of the sheathing and other material for the roof is carried up the curved exterior surface in a small car that runs on well-wheels, on a track made of reinforcing rods. The truck is held to the roof by small plates welded to the reinforcing rods and through which spikes are driven into the roof. Power for operation of the car is supplied by a single drum hoist on the ground.

A pair of concrete pylons 12x17 ft. at the base, 12 ft. square at the top and 12 ft. apart are used on each side of each entrance opening. The pylons carry a timber truss that spans the door opening at each end of the hangar. The pylons are hollow concrete structures about 148 ft. high with each wall of 12-in. uniform thickness from base to top. The pylons are constructed separately, a conventional builder's hoist being used at each pair to raise the concrete and other materials to the top of the structure.

Pylon forms built on ground

Interior and exterior forms for the pylons are built on the ground with work scaffolds complete for the 17-ft. 9-in. lifts used. Forms are moved up as a unit, being lifted by a T-head frame, jumped to successive levels and turned to 90 deg. as required to lift panel forms on the four sides. Outside forms are equipped with weather protection in the shape of inclosures so constructed that heat is retained inside reinforced paper and canvas covers.

Erection of the 330-ton, 21-ft. 9-in. square timber truss that supports the guide for the top of the doors presents an unusual problem. The track has a horizontal clearance of 220 ft. and a vertical clearance of 120 ft. The method adopted for construction is to assemble each truss on the ground between the pylons and then raise it to position by sand-box counterweights, lifting over sheaves on the pylon top. Falsework towers, necessary for assembly work high above the ground, and other expensive operations as a result are eliminated.

The doors for the structure are a six-leaf rolling segmental type 37 ft. wide, 120-ft. high and 3-ft. 6-in. thick and slide into the opening between the pylons. They will be fabricated flat on the ground and lifted to place in one piece.

Construction progress

Progress of the work, when weather conditions have not been too adverse, has been a complete 40-ft. advance in each working day. This requires that a braced-bay of the lower one-quarter of the arch be set, followed by connection and erection of the two top-quarters. Intermediate bracing then is immediately placed to stabilize the section just set. If condi appear to be such that it will no possible to complete installatio the bracing on a particular day, top section of the arch is not set the following morning, due to da from high winds if the sections not completely braced. To winds with a five-minute average locity of 67 knots (80 mph.) been successfully withstood by erection procedure described.

Keeping up with this schedule required 74 carpenters in the sembly yard to make up the equ lent of a complete arch ring and b ing in one day. The carpenters supplemented by a few labor while other craftsmen put in duits for lighting and attach hang for the monorail and catwalks to installed in the structure. A crew 14 riggers handle the lifting of tru into position for assembly into braced-bay and transfer the mater to the erection derricks.

Erection of the main trusses done by a crew of 26 men, includ two hoisting engineers, two firem and two foremen. The intermedi braces are placed by a follow crew of six, though they are a mented by the erection crew af main trusses are connected.

Who's who on the job

Joint general contractors for hangar are Karno-Smith Co. of Tr ton, N. J., and Duffy Constructi Co. of New York City. F. F. Du is project manager, L. T. Lynch, sistant project manager, John No gard is general superintendent, a L. A. DeVido is field superintende The truss timbers are precut on West Coast by Timber Structur Inc., and fireproofed in transit. Pr texol Co. are fireproofing the sheat ing.

Phoenix Bridge Co. hold subcontract for the erection of th arches, which is being done under rection of Walter C. Bearce. Th general contractor places the concre foundation and bents, fabricates th trusses and delivers them to the ere tor's derricks, then follows up ere tion by filling in the bracing and pu ting the roof on the structure.

The construction is being done f the Bureau of Yards and Docks, U.S. Navy, with local supervision of th work under Lieut. Comr. J. L. Call way (CEC) USNR, Ensign J. Legarra (CEC) USNR and Ensig C. N. Wright (CEC) USNR.

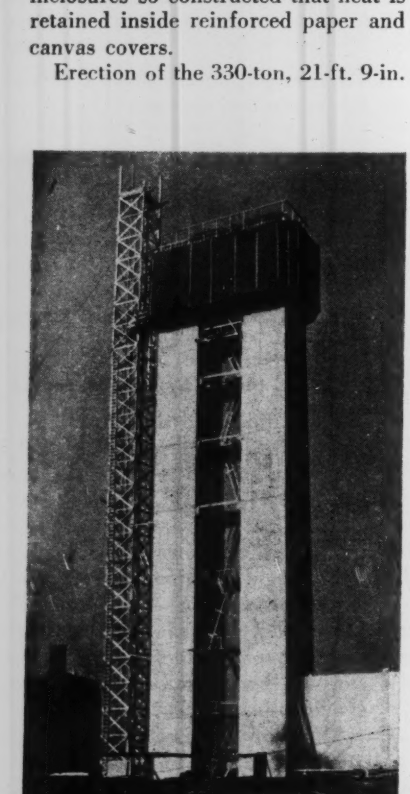


Fig. 7. Concrete pylons 12 ft. x 17 ft. at base, 12 ft. square at top, and 12 ft. apart rise through the winter to support the door truss.

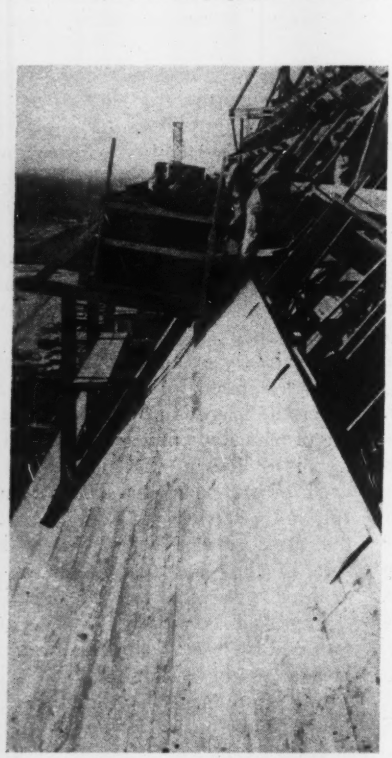


Fig. 8. Roof structure is added from a safety scaffold skidded up the completed section by hand operated winches.

Concrete Paving in Near-Zero Weather

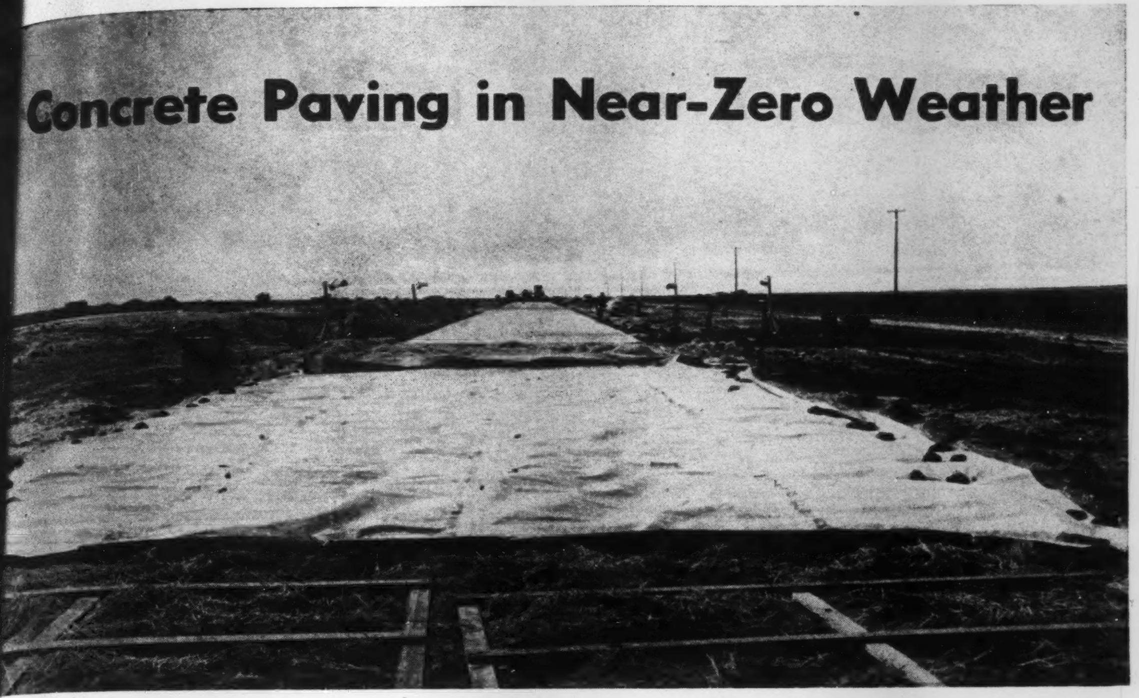


Fig. 1. Over fresh slab was placed straw and a heavy paper covering sealed at joints and weighted at the edges.

ontents in Brief — *To meet wartime necessity, runways for a large airport 1½ million sq. yd. of concrete) in the Pacific Northwest were paved in subfreezing temperatures. Usual cold weather methods were supplemented heated mixer drums, insulated truck tanks (for delivering water to mixers), lcium chloride in the mix and sand or straw covering to prevent subgrade om freezing. A 12-in. straw blanket under heavy paper protected paved rfaces until the concrete was safe from freezing. Concrete was placed fely at 7 deg. F. while nights were as cold as 9 deg. below zero.*

HE PAVING of a major military airrt in the Pacific Northwest throught the winter months in temperatures uch below the limits theretofore nsidered a safe minimum for laying ncrete pavement and on an unprecented scale, has been successfully acmplished by the U. S. Engineer rps. This project adds materially existing data on cold weather pavg, and has proved that paving operions can be carried on in winter as ccessfully as can cold weather coneting of structures, such as dams d buildings, for which protective easures are simpler.

With paving operations starting in ovember and the Air Corps desirous f having half the job ready for use y March 15 and completion of the ntire project by June 30, it became ecessary to carry on full-scale paving perations throughout the winter months. Conferences between Engineer Corps officers and contractors were held to devise and agree upon ways and means. As a result, equipment and construction methods were developed and applied, which resulted in satisfactorily meeting the production schedules at a cost not in excess of that considered justifiable by the results attained.

Two alternatives were open

Up to Dec. 1 only 6½ percent of the 1,521,000 sq.yd. had been laid. In order to meet the directive received on that date that the entire project must be ready for use June 30, 1943, two alternatives were open: (1) Pave continuously through the winter at a higher cost and a relatively lower speed, and increase rate of paving to a 10,000-sq.yd. average per calendar day after April 1, 1943, or (2) pave half of one 500-ft. runway by Dec. 31, shut down for 90 days during the coldest weather and then pave at utmost speed to meet the scheduled completion date.

Under the second plan it would be necessary to pave 1,300,000 sq.yd. in 91 days subsequent to April 1. To place an average of 14,288 sq.yd. per calendar day would call for aggregate and cement plants of larger capacities than originally set up. Moreover, the increased tempo would create new problems in rail haul, spur track capacity, concentrated cement demand and unloading facilities. Also the shortage of skilled labor for paving operations during a busy spring construction season would undoubtedly be serious. Altogether there was a strong possibility that under such heavy pressure these various contingencies might endanger chances of completion on time.

To work through the cold weather, it was estimated, would not add much more than 10 percent to the cost, and decision was made to follow this plan. Construction schedules were adopted calling for 50 percent of completion by April 1, with a cold weather plant set-up of 5,500 sq.yd. per calendar day. Subsequent to April 1, the average would be 10,000 sq.yd. per day to

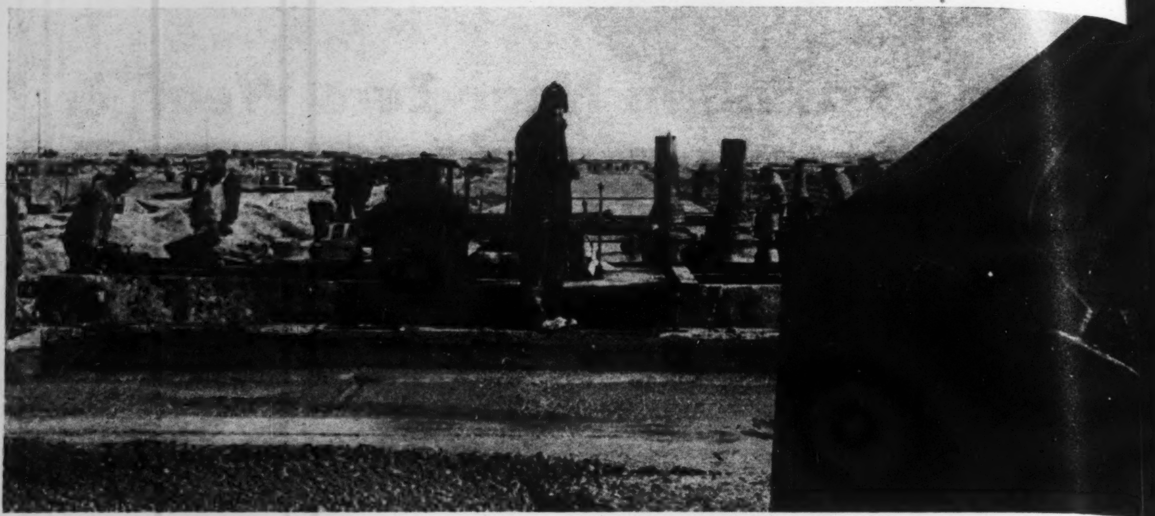


Fig. 2. The workable consistency of freshly place concrete is apparent in this view, which was taken looking from th mixers over the concrete just placed for one of the runways.

insure completion by the June 30 "deadline." That this latter schedule can be comfortably met is indicated by the fact that a few days before this was written (March 15) a production in excess of 10,000 sq.yd. was attained.

The completed job is to include two concrete runways 500 ft. wide by 10,000 ft. long which, with the taxiways, apron, etc., call for a total of more than 1½ million sq.yd. of concrete pavement. The original construction program was laid out on a basis that would require delivery of some 1,300 cu.yd. of aggregate per day and daily deliveries of 1,500 to 2,400 bbl. of cement. For operation in cold weather it was necessary to heat and protect from cold ingredients of the concrete and to provide some protection for the equipment that would handle them. It was also necessary to plan some form of covering over the prepared subgrade to keep it from freezing just ahead of paving operations.

In making plans for winter construction it was agreed that concrete would not be allowed to fall below a temperature of 60 deg. F. at any stage of placing and finishing operations, and every effort would be made to maintain a temperature of approximately 70 deg. F. at which about 60 percent of the ultimate strength could be expected in 6 days. With this objective attained the process of setting would have advanced sufficiently to prevent damage by freezing.

Insulation, housing or other cold weather protection were provided for as much of the equipment as was necessary. Aggregate-producing plants were enclosed to prevent freezing. Storage bins for aggregates were completely enclosed and heated to prevent freezing of aggregates in the bins during non-working hours and also to furnish more comfortable quarters for the men operating the scales and other batching equipment. Steam for heating the aggregate bins was furnished by a 165-hp., coal-fired boiler that delivered steam at 100 to 125 lb. per sq.in.

Water heating facilities

The water-heating plant, which was also housed, consisted of two boilers for heating water, a supply tank and two heating tanks. One 250-hp., coal-fired boiler furnished steam at 100 to 125 lb. per sq.in. for heating water, a 90-hp. boiler was maintained under pressure as a standby. Water was pumped from a nearby lake through a 10-in. wood stave pipe into an 18,000-gal. supply tank. As the lake was frozen over during the winter, it is assumed that the temperature of the water was near the freezing point. Two heating tanks of 1,800- and 2,500-gal. capacity equipped with steam coils were used in heating the water. A large supply tank was set at a slightly higher elevation than the heating tanks, thus enabling the tank trucks to be fed by gravity through the heating tanks. Mixing water was heated to 160 deg. F. during the midwinter. The water temperature was reduced to 140 deg. F. in late winter when daytime temperatures ranged from 25 to 40 deg. F.

Insulated tank trucks with capacities of from 1,200 to 1,800 gal. transported hot water to the mixers. A double layer of waterproof plywood around these portable tanks with dead-air space between the two coats made it possible to deliver water to the mixers with a loss in temperature of only about 10 to 15 deg. F.

With two concrete pavers working abreast of each other inside the 25-ft. width of runway strips, it was found expedient to interconnect the hot water delivery piping to the two mixers. Under this plan tank trucks supplying the water needed access to the mixer pair at only one point, and from there could pump into a common system serving either mixer.

When paving operations were started last fall the standard cement content of 1¼ bbl. per cu.yd. was used, but when the weather became cold this was increased to 1½ bbl. and calcium chloride was added to the mix at the rate of 1 and 2 lb. per sack of cement—the ratio of calcium chloride within this range depended upon the temperature prevailing at the time.

Adjoining the batching plant equipment was erected for drying and heating the coarse sand to a temperature of about 150 deg. F. The dryer is an oil-fired rotary kiln into which the sand is fed from a bucket elevator. Inside the cylinder, angle bars pick up the sand and let it fall through a stream of hot gases kept in motion by a 30-hp. blower.

An oil burner to function as a torch or "flame thrower" was first attached to the mixers so that heat from flame would pass into the mixer m. These were later discontinued ause of the small amount of heat ived from the flame during the rt periods of time the batches were ng mixed.

Subgrade protection

Two alternate methods of subgrade tection were given consideration: To leave finished subgrade exed and then thaw out the frozen as just prior to paving, or (2) to tect the subgrade by blanketing it h a 12-in. layer of straw or a 6-in. er of bank-run sand and remove s immediately preceding paving. is latter method was decided upon, d as the pavers approached this nket cover it was bladed up with grader and removed with carryalls bulldozed to one side into windws whence it could later be used ain. A means of keeping down the erating costs in this part of the rk was to delay the fine grading erations until the approach of the vers, thus reducing to a minimum e time of exposure.

At first it was not realized how seous an effect the very low temperares would have on the subgrade here finished far in advance of the ving. On one strip the prepared subade was so solidly frozen that it as necessary to rip it out. To facilite ripping, strip fires were built 10 apart across the subgrade to soften a strip that would give the ripper opportunity to sing its teeth into e subgrade. Material ripped out as replaced with unfrozen material ucked in for the purpose. When this as done and the surface again fine aded, it was covered with a 1-ft. yer of loose straw or 6 in. of dry nk-run sand until only a few hours efore placing the concrete. One foot loose straw or hay was found to otect the subgrade from freezing for period of from 4 to 5 days at an air mperature of 10 deg. F., and for pproximately 2 weeks at air tempertures of 20 deg. F.

Although steel forms were proided for this work, the lower heat nducting qualities of wood made it eferable to use the latter during the ldest weather. The use of steel forms ill be resumed with the return of ilder weather.

Paving and finishing equipment d methods used on this job comared in general with that ordinarily mployed. However, all along the line from batching plants to the protection of the completed pavement, the operations were synchronized so that the stream of materials moved rapidly and without interruption and there was a minimum of exposure to the cold air.

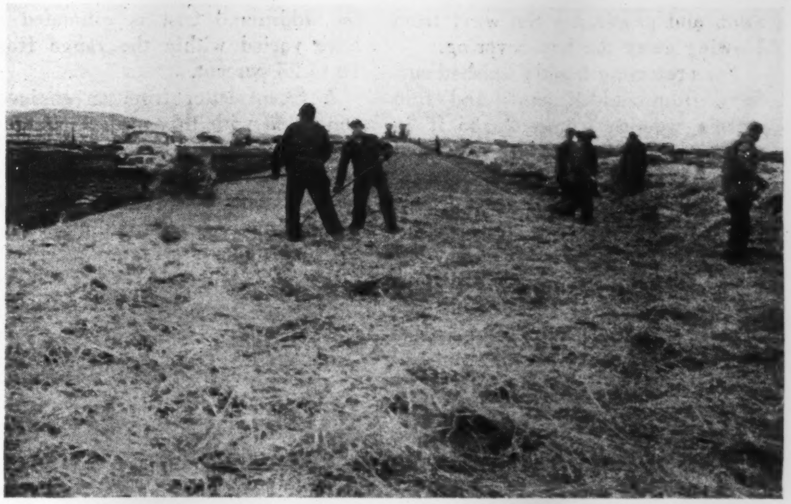


Fig. 3. Fresh concrete is here being covered with straw which workmen fork in from piles alongside the paved strip.

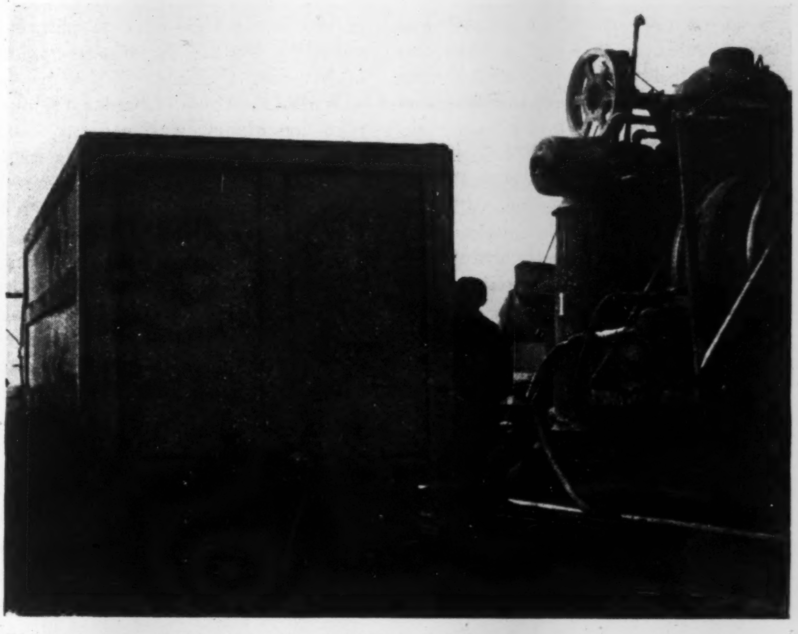


Fig. 4. In insulated tank trucks of 1,200 to 1,800-gal. capacity, water arrived at the mixers at 150 deg. F. A connection between the mixers facilitated truck delivery from one side only.

Protective blanket of straw

Straw or hay was adopted as the most economical and convenient method of insulating the pavement against cold, as it could be picked up and reused many times. Some 3,000 tons of hay and straw were purchased within a 100-mi. radius of the job, and stockpiled at convenient points along the runways and other paved areas.

As soon as the newly finished concrete was sprayed with a liquid curing compound, and it could be done without injury to the surface, the hay was spread over the surface in layers about 1 ft. thick. On top of the straw heavy waterproof paper was placed in 25x25-ft. sheets. This served the dual purpose of reducing heat radiation and preventing the wind from blowing away the hay covering.

For protecting freshly finished surfaces from sudden snow and rain storms, wooden frames 25x35 ft. in size, spanning the 25-ft. concreted strip, were used as supports for canvas covers. Enough of these frame covers were made up, in 25-ft. lengths, to cover 800 lin.ft. of paving. The 35-ft. dimension is the width, thus giving a 5-ft. overlap on each side of a 25-ft. paved strip. These covers were used only to protect the finished surface until such time as the usual straw covering could be put on safely. Ordinarily, except during snow or rain, it was possible to leave the finished surface exposed until the straw could be safely put on.

At what temperature must work stop?

The question "At what temperature must paving operations stop?" was unanswered as this was written. On this project paving operations were carried on one day during temperatures of 7 deg. F. followed by a night temperature of 9 deg. F below zero. Under the blanket of straw and heavy paper the temperature was 48 deg. when it was 9 below outside. The minimum temperature at which concrete pavement may be safely placed is believed to depend largely upon the efficiency of the cold weather equipment, the methods employed, and the degree of care exercised in each of these operations. Observations of the successful methods used on this project, however, seem to indicate that large scale winter concrete pavement construction, although somewhat more expensive, can be successfully carried out even though the daytime temperatures are not many degrees above zero. Paving operations were stopped on one day at 20 deg. above zero under an extremely high north wind that froze the mortar to the floats.

Concrete placement per day

Average amount of concrete placed on working days in January was 5,350 sq.yd. On a typical day in February, when maximum temperature was 40 deg., minimum 11 deg., 6,689 sq.yd. of pavement was placed.

Just how much the necessary winter precautions have increased the cost of paving has not been definitely determined at this writing. For the varying degrees of protection required as the temperatures have fluctuated, the additional cost is estimated to have varied within the range from 10 to 25 percent.

A recent letter from an engineer connected with this project contains the following:

"Not all the visitors are engineers. There are some 300 range horses who do their calling during the night. These 'critters' are less interested in the scientific principl cold weather concreting than in savory edibles used for protec Result: three professional cow added to the contractors' payro shoo away the horses until the 3 tons of hay has seen the conc safely through the cold weather ing period. 'Home on the Range' never like this!"

Regional Planning Solves Many Wartime State and City Problems

Increasing dependence upon regional planning—a tool for solving planning problems that cross city and state boundaries—as an aid to the war effort on the home front is reported in a review of 1942 planning activities by the American Society of Planning Officials.

Within metropolitan areas, regional plan machinery was used to meet problems ranging from gearing water systems to expanded wartime demands to arranging mass evacuation of civilians in case of enemy attack.

In Baltimore, and Baltimore and Anne Arundel counties, the Baltimore Area Joint Committee established in November, 1941, tackled problems common to city and counties including streets and highways, zoning, parks, schools, waterworks and fire protection. In Cleveland, the Regional association acted as technical adviser to the Cuyahoga county defense council on one of the first civilian evacuation programs perfected. In Pennsylvania, the Harrisburg Regional Planning Commission worked on traffic relief plans in connection with war industries.

Detroit's mayor took note of "area" problems by appointing a regional planning committee for the metropolitan defense area, while in Alabama the Central Planning Committee, including the towns of Florence, Sheffield, Tuscumbia and Muscle Shoals City, worked with the Tennessee Valley Authority on housing for war workers, site selection and plans for future development

A wartime transportation survey, whose object is development of a master transportation plan for the entire Los Angeles area, was made by the Los Angeles County Regional Planning Commission.

Of larger scope were activitie regional offices of the National sources Planning Board, the York Regional Plan Association, Pacific Northwest War Indust Commission and the Northwest gional Council. The New York gional Plan Association worked business and industry in the area post-war plans growing out of p ent economic changes, which can further developed.

A Midwest Regional Planning C mission with headquarters in Chic was set up by the National Resour Planning Board, which earlier in year opened a regional office in S Juan, Puerto Rico. Other regio offices of the NRPB in California a New England were especially act in developing plans for the ar served.

As Bonneville and Grand Cou dams in the Pacific Northwest ope to full production, the Northwest industries commission surveyed dustrial possibilities of the area a made recommendations to the W Production Board. The Northwest gional Council issued its second e nomic atlas of the region contain detailed information on populati migration, climate, industries a other facts.

Regional planning techniques h a good chance to prove themselves wartime, when many new econom social and service problems come that are not limited to one unit government, the society said. The pansion of war-boom cities which its start in 1942 may be expec during the coming year to reveal so good examples of problems that h been or can be solved more eas by regional than by municipal pl ning.

aste Water Survey "Saves" Plant Capacity

W. R. Schnabel
Superintendent and Engineer, Allentown, Pa. Water Department

***tents in brief** — Discovery and elimination of underground leakage in ater distribution system, which totalled more than 3 mgd., has made it ble for Allentown, Pa. to defer the construction of new supply facilities ite increased war demands. Furthermore, the waste water survey pro- data showing under-registration of large meters serving industrial users, as a result some $4,800 additional annual revenue will be obtained.*

RONTED with a sharply increased nd for water due to the require- s of war plants and increased lation, Allentown, Pa. early in was faced with the prospect of ng a major addition to its treat- plant facilities. However, the ulty in securing priority ratings materials led to a decision that a waste survey be made to dis- and eliminate all types of leak- This survey resulted in a daily ng" of more than 3 million gal- and produced other benefits ting to more efficient and economical operation.

he Allentown situation is best un- ood, perhaps, by first detailing background. The total plant city is nominally 22 mgd., of h a little more than half is se- d from two large springs and other half is pumped and filtered the Little Lehigh Creek. Prior 937, when a 10 mgd. filter plant built the entire supply was ob- ed from the two springs. Con- ption has increased steadily from to year and by 1942 it nearly rbed the excess of capacity over and. In 1937 the average daily sumption was 13.7 mgd., reaching aximum in 1941 when it was 3 mgd.

ost of the water is sold on a flat . On the 24,150 services there only 320 meters in use, most of ch are on large industrial and mercial establishments. Water s on the flat rate as well as on er schedule average as low as in the country.

ll the water is pumped into the ribution system, on which float distribution reservoirs of 10 and mg., respectively. There are 169 miles of cast iron mains of 4 to 36 in. in diameter, some of which are a century old. All services are of lead and many are from 75 to 100 years old. In the system there are 3,513 street valves and 1,100 fire hydrants. Of the valves enumerated, 763 or 69 percent are control valves on fire hydrant laterals.

As the demand increased during the past few years and by 1942 was reaching the theoretical capacity of the plant, one of two steps had to be taken: Either the filter plant had to be enlarged, or the pumpage had to be reduced by eliminating waste of water from defective house fixtures and from leaks in the distribution system. The latter course was adopted by the City Council, with the result that a contract was made with The Pitometer Co. of New York for making a water waste survey of the system.

This survey included tests for leakage in the distribution system, the testing of all meters 4 in. or larger in diameter in place, a test of the 30-in. cast iron gravity water line 26,000 ft. in length, as well as a test of the pumps for slip and efficiency. The work was started in March and

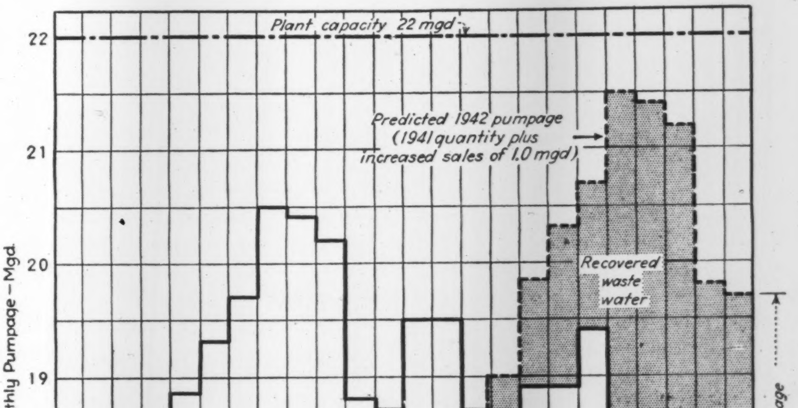


Fig. 1. Monthly water pumpage rates for 1941 and 1942 at Allentown, Pa. The 1942 pumpage would have been greater by about 3 mgd. if underground and other forms of leakage had not been eliminated. The "recovered waste water" is indicated by the shaded portion.

completed in December. At the end of 1942, therefore, the city was in a position to evaluate the work and form judgment as to its value. That the investment was profitable, is evidenced by a recital of the benefits derived from the survey.

Leakage eliminated

First, a total of 3,170,000 gpd. was saved by the discovery and elimination of 190 underground leaks in the mains and services. In addition, 158,000 gpd. of house waste from defective plumbing fixtures was stopped and under-registration of industrial meters amounting to 330,000 gpd. was uncovered. Although all domestic services are on a flat-rate basis, it should be noted that the house waste was very low, eloquently testifying to the frugality of the consumers in this old Pennsylvania community. Actually, it amounted to about 6 gpd. for each service, averaged over the system as a whole.

As a result of these savings, the demand for water is now between 17 and 18 mgd. although industrial sales have increased over 1 mgd. during the past year. This compares with a consumption of about 19.5 mgd. in the months immediately preceding the survey.

The accompanying chart shows the manner in which the survey affected the output of water. The daily average output for each month of 1942 is compared with the like month in 1941. It should be noted that in the months just prior to the survey, the consumption had increased 2 mgd. over that for the same period in the preceding year. At the conclusion of the survey, the demand was 1.75 mgd. under the preceding year. This would indicate a saving of 3.75 mgd., which checks very well with the sum of the measurements of the individual leaks.

During the course of the survey 200 defective valves were found broken or leaking. Of these, 97 were repaired in 1942 and the remainder will be repaired this spring. The distribution system then will be 100 percent efficient and ready for any war-created emergency whether due to damage from the air or to demands for additional supply by war industries.

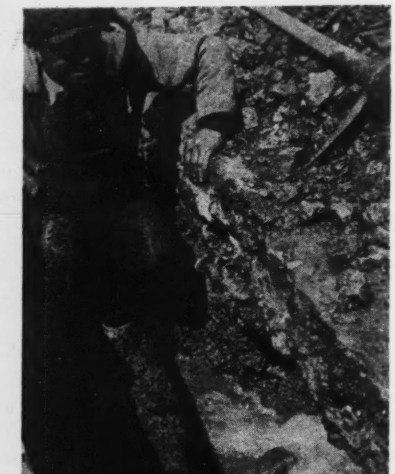


Fig. 2. One of the ways by which water was "lost". This broken 6-in. main discharge 160,000 gpd.

Cost and benefits

The water bureau kept an accurate cost account of the work done by all the crews engaged in the actual survey as well as those who cooperated in the repairing or installation of valves, stopping leaks, repairing broken mains, etc.

A summary of these costs is given in Table I.

The cost of the survey per million gallons saved was $15.80, extending over a period of one year. As the repairs were permanent, the savings will extend indefinitely into the future and the actual cost will be but a small fraction of the initial figure.

The total cost of locating and r pairing the leaks, including Th Pitometer Co. fee was $21,083. Fo this expenditure the saving in wat was about 3.5 mgd. But we save more than the pumping and purific tion costs of this water—we save plant capacity, which in these day of priorities and "doing with less" very important. Plant capacit equivalent to 3.5 mgd. was obtaine at a cost of $21,000—this is at th rate of about $6,000 per million gal lons per day.

It is interesting to note that $6,00 represents one-sixth the cost of fil ters alone, based on actual cost esti mates of $36,000 per million gallon for a filter installation to be con structed when materials are agai available.

The city sells water at 4¢ per 1,00 gal. net to consumers of over 750,00 gal. per month. All water bills, either on flat rate or meter schedule are billed gross and a 50 percent discount is given if paid before a certain date. Thus it is that a gross charge of 8¢ per 1,000 gal. becomes a net charge of 4¢ per 1,000 gal. if paid on time. We have very few delinquent accounts. The annual under-registration of large meters discovered through the survey was 120 mg., which amounted to $4,800 additional revenue.

One of the more interesting discoveries showed that a fire line had been tapped without authorization. Measurements revealed the use from this line to be 290,000 gpd. and to have an annual value of $4,234. A satisfactory arrangement for the payment for the water that had been used was reached, and provision made for payment on all future use.

Unfortunately, we have not in the past made the metering of all industrial services compulsory. As a consequence, we discovered that several such consumers were greatly benefited by being permitted to purchase water on a flat rate. Their bills were but a fraction of what they should have been if the water was purchased on the metered basis. Seven such consumers, whose combined annual net bills on a flat rate basis was $5,515 used sufficient water to raise their combined annual bills to $17,429 if billing had been based upon our net metered rate of only 4¢ per 1,000 gal. This will represent an increased annual revenue of $11,914 to the bureau when meters

TABLE I — WATER WASTE SURVEY AND REPAIR COSTS

Fee to The Pitometer Co.	$11,000
Labor and supplies, including installation of gauging points and cost of house inspections	7,067
Cost of leak repairs (excavation, materials, paving etc.)	3,016
Cost of locating and repairing leaks	$21,083
Cost of repairing 200 defective valves.	
1942-97 valves	$3,671
1943-103 valves (Est.)	4,756
Cost of valve repairs	$8,427
Total Cost	$29,510

TABLE II — SUMMARY OF WATER LOSSES MEASURED IN GALLONS AND DOLLAR REVENUE

Character of Waste	Gal. Per Day	Annual Value
Underground Leakage		
Main leaks (42)	1,596,000	$46,311
Fire hydrant leaks (3)	32,000	
House service leaks (145)	1,544,000	
House waste	158,000	2,307
Unauthorized use	290,000	4,234
Under-registration of industrial meters	330,000	4,818
Increased revenue from industrial flat-rate accounts	816,000*	11,914
TOTAL	4,766,000	$69,584

*This figure represents that portion of present use for which existing flat-rate charges provide no payment.

have been installed on these services.

In Table II is given a summary of the savings that have resulted from the survey, including the possible increase in revenue when all industrial services are metered.

A complete summary of Allentown's experience must include not only a tabulation of the financial benefits, such as is given in Table II, but also a recapitulation of intangible values. Most important of the latter was the discovery and elimination of leakage that made it possible to defer for the "duration" expensive enlargements to meet special demands. The survey also provided information on the condition of all underground structures, and was of much value to the personnel in furnishing data on the operation of the 2,750 main street valves and the location of lost mains and services. We now know that if occasion arises, due to air bombing of the city resulting in broken pipes, that these mains can be duly segregated in any part of the city so that minimum inconvenience will result.

The survey, as it progressed, had a satisfying effect on consumers who were informed of activities through the local press. These news accounts of the total water being saved, together with pictures of the large leaks found, helped to make the consumers "leak conscious." As a result public cooperation was secured in stopping home leaks, a fact that is proven by the remarkably low amount of house waste found.

Director of the Allentown water department, under whose direction the survey was made is Clarence R. Mensinger. The writer is the superintendent and engineer of the department. Operations of The Pitometer Co. were under the general direction of Homer E. Beckwith, district manager, who was assisted by D. M. Carter and W. D. Hudson, field engineers.

Widespread Need for Public Works Makes Immediate Planning Imperative

ASSERTING that there was no room for argument as to the need for public works, Maj. Gen. Philip B. Fleming, administrator of the Federal Works Agency, recently told a meeting of labor, business and government representatives in St. Paul, Minn., that "whatever the future may bring, we can be sure that we are going to keep right on needing good highways for business and pleasure, schools for our children, hospitals for the sick, uncontaminated sources of water and sanitary sewage disposal systems."

It seems obvious, said Gen. Fleming, that government—all kinds of government, federal, state and local—will have to put public works construction somewhere near the heart of their postwar planning. In this connection, it will be necessary to decide upon a nationwide plan, so that there will be a national reservoir of public works that can be turned on when and where the employment need is great, and turned off where and when the need is not so great.

Public works, he continued, can stand on their own merits, and it is not necessary to hold a debate to decide whether it is wise for government to provide jobs for everybody or jobs for nobody. Public works would still be needed if the providing of them did not create a single job. Public works do not compete with private business. A new and better municipal waterworks, for example, does not injure business; it is an aid to business, and it is as much of an aid to small business as to big business.

No conflicts are visible

The only possibility that the building of public works might come into conflict with private enterprise would be in a situation of great material and labor shortages, with government and private business competing for the limited supplies. "We are not likely to have that kind of a situation immediately after the war," said Gen. Fleming.

To finance a nation-wide program of public works, the Congress may decide to make direct appropriations for certain projects. Cities, themselves, whose financial status has improved materially in recent years, can do one of several things, he pointed out. They can maintain present tax rates and thus build up reserves for capital expenditures later on, or, they can pay off debts and so pave the way now to facilitate bond financing in the future.

If we can have a public works program that will make jobs at a time when jobs will be sorely needed, we need something more than money and good intentions, he cautioned. Jobs become available only after sound plans have been made, and these call for a number of important preliminaries. Sometimes land must be acquired through the time-consuming process of condemnation in the courts. Sometimes bond issue referenda must be held. Architects and engineers must produce the working drawings. Bids must be solicited by advertising. All these things must be out of the way before construction gets under way.

Avoid past mistakes

"There are some," concluded Gen. Fleming, "who tell us that this is not the time to bother about the future; that the only thing we should think about now is the winning of the war, after which the future will take care of itself. That was the mistake we made the last time. Unfortunately, the war and the peace that is to follow it are not separable. And unless we concern ourselves now with the sort of world we want to live in hereafter, our war-time sacrifices may prove to have been in vain."

Sanitary Fill Experience at San Francisco

***Contents in brief** — For ten years a sanitary fill has been operated with notable success on the shore of San Francisco Bay, making disposal, in recent years, of some 650 tons per day. Rate of fill settlement, equipment selected for economical operation, characteristics of the exposed face and technique of cover placement have all had constant, expert attention. Some of the observations and conclusions are here recorded.*

TEN YEARS AGO San Francisco abandoned an antiquated garbage incinerator and began sending several hundred tons of waste material collected daily by scavengers to a sanitary fill on the shores of San Francisco Bay just over the county line. When the fill operation started the site was a useless tideflat on which mud depths ranged up to 40 or 50 ft. Today, a 90-acre area of the mud has been replaced by level land, and this attractive site for future industrial development gives no indication of being the burial ground for some 1,800,000 tons of waste.

Thus far the fill has been extended a little more than half a mile along the Bay shore. Ultimately the length is to be a mile. At both ends of this mile are earth-and-rock deposits conveniently located for down-hill haul to the fill, for which cover material totaling about 3,000,000 cu.yd. is available. The fill is built up to a height such that after 5 to 10 yr. when the full settlement has occurred, the final level will correspond with that of the stabilized grade of the adjoining railroad yards.

This fill-and-cover operation is continuing under the same management that inaugurated this method of disposal and with more than 75 percent of the original personnel. Thus, in the 10-year operating period there has been a rare opportunity to improve methods and equipment and to apply the refinements that have been developed as the result of long and expert observation. An early report on the operation of this fill was published in *Engineering News-Record*, Feb. 27, 1936, p. 314. Later notes appeared in the issue of July 6, 1939, p. 27.

Population of San Francisco during the past decade has fluctuated from a low of about 635,000 during the depression to a maximum estimated at about 695,000 in 1943. On normal weekdays the scavengers' collections now fill an average of 27 gondola cars, each carrying about 24 tons. On Saturdays the collectors make one trip which brings in 60 percent of an average days run, but the fill is not operated on Saturdays. The peak loads always occur on the fill on Mondays and sometimes amount to 44 cars or a little over 1,000 tons.

There is little change in weight per car from season to season. During periods of heavy rainfall, however, the weight is increased about 15 percent by the water absorbed in refuse kept in open cans or standing in gondolas exposed to the weather. Despite the tonnage basis for payment, the contractors find it less profitable to handle rain-soaked garbage because the additional weight does not offset increased cost of wet-weather operation, notably wear on tires.

Restaurants and hotels in San Francisco sell table and kitchen waste direct to hog farms, thus disposing of a considerable tonnage of "wet garbage." As unloaded on the fill, the San Francisco refuse is of notably dry appearance and would seem to have even less than the 55 percent moisture content shown by tests made some years ago.

San Francisco collects what is classed as "all household and commercial waste" without any attempt at segregation. Hence, while garbage is included, the larger part of the material is more accurately classed as refuse and has the dry quality and appearance of refuse rather than kitchen waste.

During the past year the effects of war have become manifest in the quantity and kind of materials arriving at this fill. The tonnage is estimated to have been decreased 7 percent by wartime economies. Th are fewer cans because of the dri to collect and reclaim tin and l food is wasted. And the higher pric for fruits and vegetables are reflect in less refuse from this kind of foo Because of higher wage averages a the fact that so many women now ho industrial jobs, the percentage meals eaten in restaurants has i creased even above San Francisco high prewar average.

Here are some comparative fi ures: "The most restaurant-lovin people in America are San Franci cans who, by a 1939 count, spent a average of $91.25 per person tha year in dining out against only $61.8 for New Yorkers and a mere $41.0 for Chicagoans."

Economical equipment

The same number and size o dump trucks are now hauling cove material that were used when thi sanitary fill was started. Practicall all the other equipment, however, has been changed over to more powerful or larger capacity units. These changes have been chiefly for the purpose of providing capacity so that the peak loads of Monday can be unloaded and covered during the working day. The changes have also effected savings in daily operations, avoiding overtime when delays occur during periods of heavy rain or due to equipment failure. Generally speaking, the changes have increased the tonnage handling capacity about 25 percent.

The capacity of the shovel that loads the trucks in the quarry has been increased in size from 1 to 1½ cu.yd. and the type now used has teeth adapted to digging rock. The three locomotive cranes on crawler treads that unload the gondola cars with clamshell buckets all have larger buckets. One has a 1½-cu.yd. capacity and the other two are 1¾ cu.yd. The original gas engine tractors of 60-hp. capacity have been replaced by three diesels of 75- and 90-hp. ratings. These have extra wide bulldozer blades with a high central section to facilitate shoving high piles of light material (Fig. 3). The usual program is to carry on operations at fill with two of the tractors, re-ing the third as a spare for relief ice during repairs, for emergen- and high peak loads.

he usual assignment is for one tor to devote full time to shoving piles of refuse unloaded from gondolas to the brink of the fill . The second tractor aids in bull-ing, as required, but also moves he strings of gondola cars as they needed and makes such placement over material as may be necessary ing the bulldozing of refuse. When refuse is unloaded one tractor s off; the remaining tractor can sh the covering operation without iculty.

To prevent spillage along the rail-d right-of-way "gates" consisting a wire mesh in a metal frame are ached, with chains, to the sides of gondolas. These are swung up lie on top of the loaded car while transit. They are swung outward hang at the sides while the car is ing unloaded.

The crane operation requires a illful man at the controls because eed and economy dictate the use as large a clamshell bucket as ssible. The 1¾-yd. capacity is the rgest found practicable for a gon-la car 9 ft. 4 in. wide. Inexperi-nced operators have caused exces-ve repair costs on the gondolas—rticularly undesirable under pres-t conditions—but the experienced en rarely allow the bucket to touch e side of the car despite the average f 20 minutes as the unloading time r a 24-ton gondola. Allowing for oving cars, etc., the two cranes can nload 36 cars in an 8-hr. day. If ore cars are received, as on a con-ested Monday, the third crane is put into operation to reduce overtime nd to have all refuse unloaded with ufficient time remaining to complete overing operations before 5:30 p.m.

At first it was proposed that the ondolas be washed out daily. The elative dryness of the refuse, how-ever, is such that it was decided more harm than good would be done by wetting the car interiors. When the clamshell bucket has unloaded half the car, a car tender enters it, taking with him a stable broom and a shovel. While the second half is being unloaded he clears out the corners and prepares for a final bucket load that will remove everything but a few remnants, which he shovels overside together with whatever can be swept up with the stable broom. This keeps the cars in a very satisfactory condition.

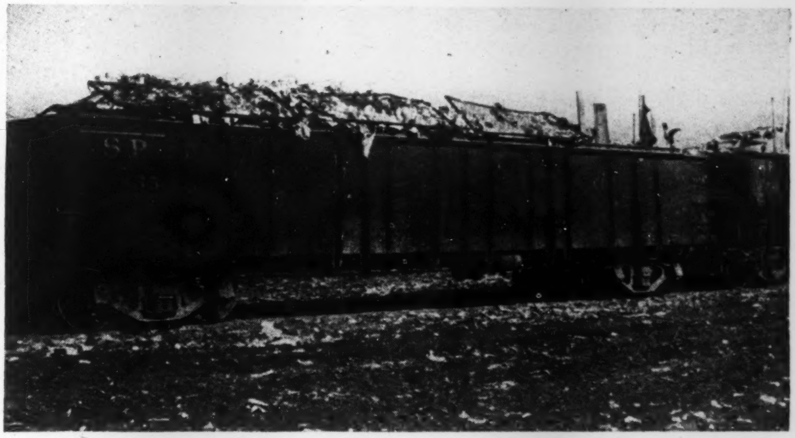


Fig. 1. Metal "gates" swung up on the 24-ton garbage load in a gondola prevent spillage along the track.

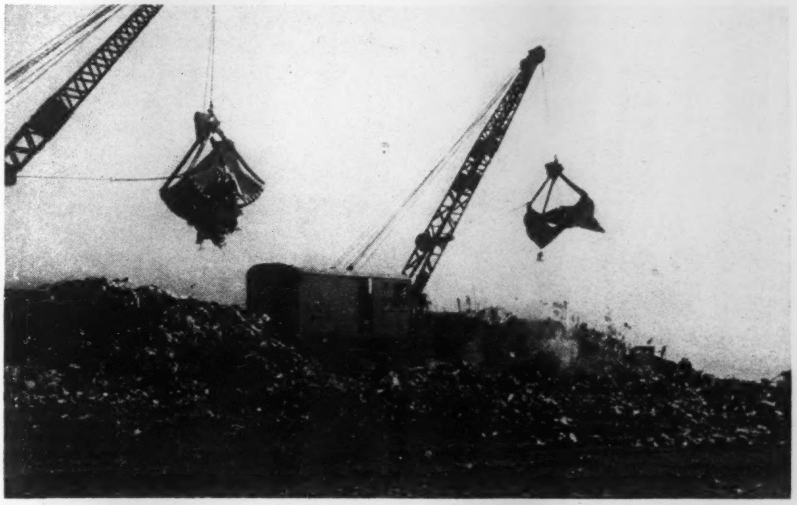


Fig. 2. Unloading with 1¾-cu.yd. clamshell buckets takes 20 min. per car.

Rock in cover material

Cover material now being taken from the hill at the north end of the fill has a higher rock content than would be ideal; about 90 percent of the yardage now being excavated has to be first loosened by blasting. This increases the cost but the rock makes excellent road building material—roads on the fill have exceptionally fine surfacing. The material for cover has become more costly and more difficult to obtain as the faces of the various benches move forward and advance toward the solid core of the hill. This cut is now about 200 ft. high.

Some economy was effected by the substitution of the larger dipper on the power shovel with teeth designed for rock excavation. Even so, many "niggerheads" require to be broken up with small charges of powder. This higher percentage of hard, coarse material increases the fire risk in the fill by giving a more porous cover layer through which air can infiltrate, thus providing oxygen to support combustion.

Settlement of fill

Operating conditions at this fill are such that there is not much use in trying to keep the finished surface uniformly level as the fill increases in area. Irregularity of settlement up to differences of about 6 ft. seems to be inevitable. Wherever depressions are sufficient to entrap surface water during the rainy season, an

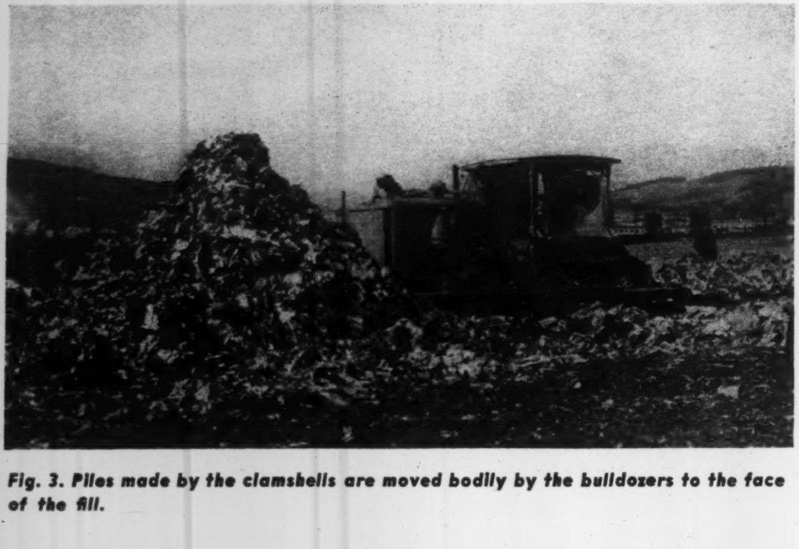


Fig. 3. Piles made by the clamshells are moved bodily by the bulldozers to the face of the fill.

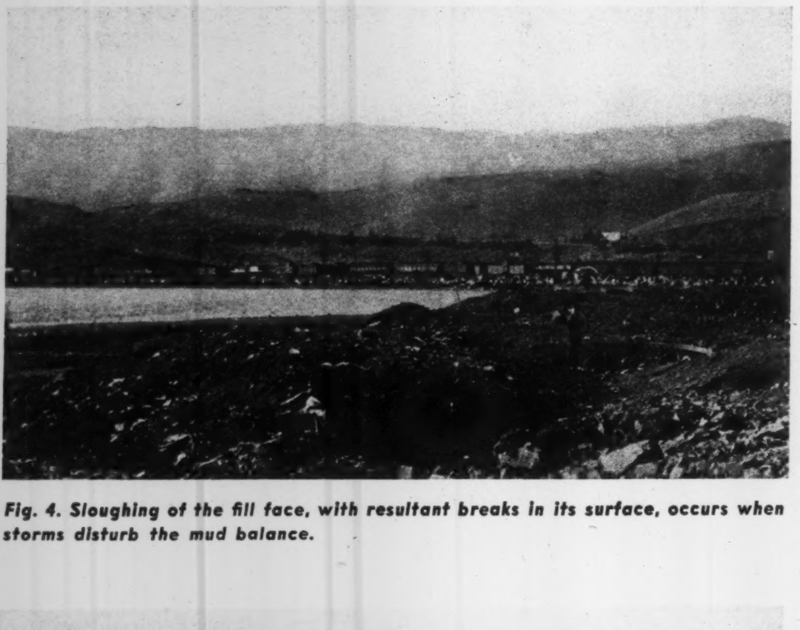


Fig. 4. Sloughing of the fill face, with resultant breaks in its surface, occurs when storms disturb the mud balance.

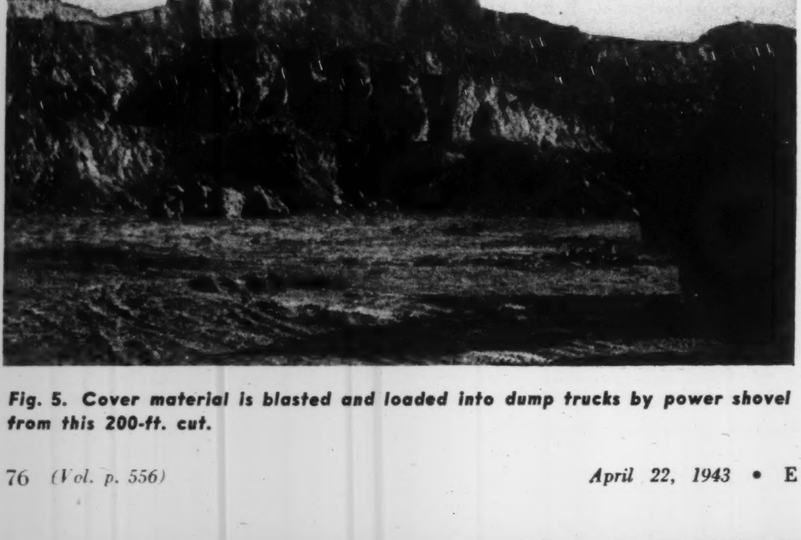


Fig. 5. Cover material is blasted and loaded into dump trucks by power shovel from this 200-ft. cut.

additional layer of refuse is spread over the depressed area, followed by a layer of cover material.

After the day's delivery of refuse has been unloaded and pushed over the face of the fill, one tractor attacks the windrows of cover material that have been built up by dump trucks in piles like lateral morains along the sides of the strip on which refuse has been bulldozed from gondolas to the face. From this convenient position the cover is speedily spread by the bulldozer in the desired 12-in. minimum layer over the day's deposit of refuse. About 600 cu.yd. of cover is required for the average day's work.

By using the windrow method of piling up the cover material in advance, the trucks can work more economically, avoiding interference with the tractors and finishing their day's work earlier than otherwise. The 600 tons of cover now used daily, under present working conditions is delivered to the windrows by four trucks in 6 to 7 hr. Similarly, with the windrow method the tractor has an adequate supply of cover waiting to be spread and can complete the day's work within an hour after the gondolas are unloaded—much quicker than under the program earlier employed.

Managing the fill face

When this method of disposal was first started the fill was built out to a width of about 900 ft. The plan is to maintain this width for the mile-long distance between the two promontories of available cover material. After the fill attained this width, additional deposits have been made only along the face toward the second source of cover material, thus continually extending the fill in that direction.

Along the Bay edge the fill is kept 4 to 6 ft. higher than at the inshore edge to allow for the additional settlement that is expected in the outer and deeper water.

As the fill moves ahead into deeper water operations are controlled so as to displace as much mud as possible by squeezing it out in advance of the fill thus getting the maximum depth of solid fill with a minimum of underlying mud.

The weather has an important bearing on operation designed to keep the toe of the fill well under control. At present the depth of soft mud nder the toe is about 40 ft. and early all mud to this depth will be orced out ahead of the slowly adancing fill under the weight of the urcharge and the compacting vibraion caused by operation of the tractors.

If storms occur and this adancing mud wave is removed or artially removed rather suddenly, he balance is disturbed and the face f the fill tends to slough. Then wide racks open up and allow underlying aterial to slide out farther than the urface material moves. This may ause lower portions of the slope to ake a reverse or inshore inclination.

After such a movement it has been found best to discontinue filling at this point until the substrata can readjust themselves. Otherwise the additional load causes a still further slipping, soft mud creeps up into the cracks, the toe of the slope becomes an island and the desired uniformity of the fill face is destroyed. The rule is: "When a slope is moving, don't work on it."

As much as two or three weeks may be required for this stabilizing readjustment to occur after a severe storm disturbance. Hence, the program of advance is always to work on the outer or more exposed portions of the face during the season of calms and to have available inshore disposal area for the stormy weather. Following this technique has greatly improved control of the active fill slope.

With a 40-ft. depth of mud and a required finished level 8 ft. above mud line, the program is to make the fill about 60 ft. deep, thus allowing 12 ft. out of the 60 for settlement to ultimate level. This 20 percent has been found to be what normally can be expected as ultimate settlement in a fill of this type after 8 to 10 yr.

Where the advancing fill is deep, particularly if sloughing occurs opening cracks that admit air, there has been some risk of fire. Even under ordinary conditions temperatures in the freshly covered fill rise very high (thought to be on the order of 160 deg. F.) and steam will be seen on cold mornings escaping from cracks. A black sulphureous liquor usually trickles from the outer toe of the fill, but this has relatively little odor and the wash of the tides prevents any nuisance therefrom.

Gas, presumably methane, escapes from the cracks and also has been noted in test pits sunk in interior parts of the filled area. This gas will ignite readily and is a factor in the fire risk. Fires never occur on the level or finished surface of the fill. They do start occasionally along the edge of new fill, within six to eight months after placement and where the cover is porous enough to permit gas to escape. Spontaneous combustion is usually the cause.

As an aid in fighting fires a portable (two-man) pump has been provided with some 400 ft. of old fire hose. If a cover of earth does not smother a fire (a supply of earth is kept on the fill for this purpose) the pump is set up and Bay water is discharged on the surface of the zone that is burning. The fires have been infrequent, have never been serious and are not considered a hazard.

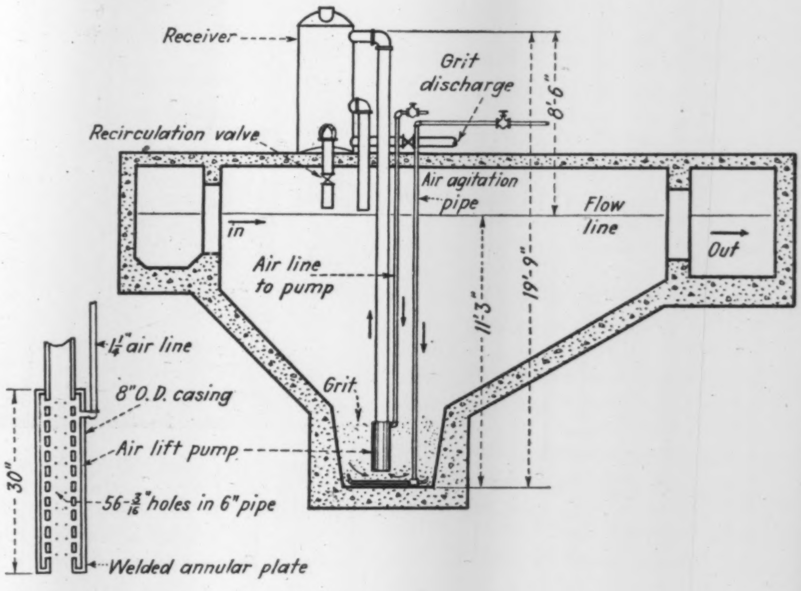
The contract for carrying on the sanitary fill is held by Easley and Brassy, San Francisco. John J. Casey is city engineer.

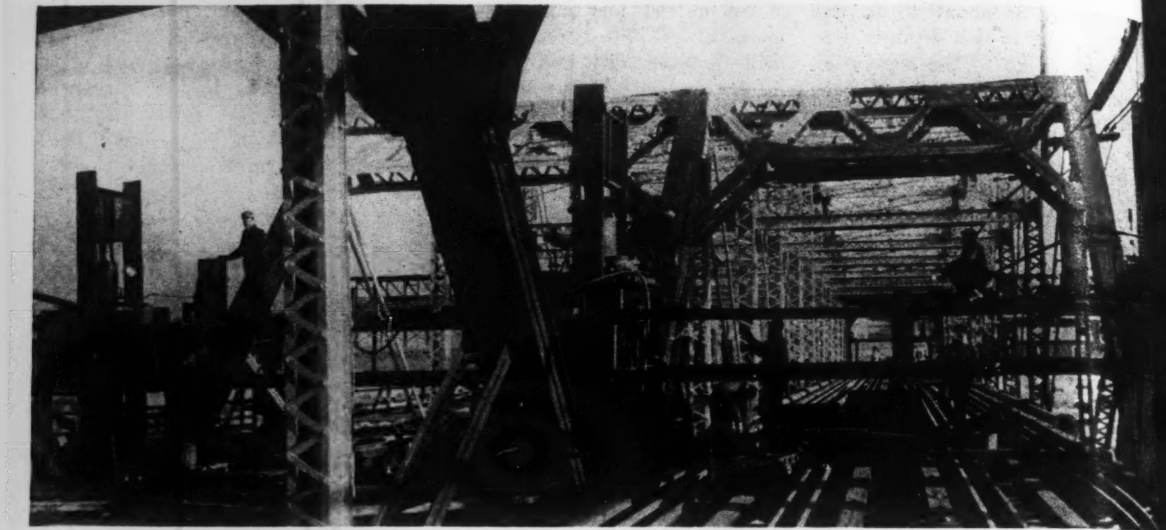
Air Lift Pump Used to Clean Sewage-Disposal Grit Chambers

An air-lift pump and a special arrangement of piping have been found a decided improvement in methods of washing and removing grit from the grit chamber of the Olean, N. Y. sewage-disposal plant. The accompanying drawing shows the arrangement of pump and piping.

The reason for adopting compressed air was that mechanical devices of the conveyor type are expensive and only incompletely serve the purpose. The conveyor equipment, which was under consideration for the Olean plant, would have cost $5,000. Using largely scrap materials the air-lift pump was constructed for $75; a portable 105-cfm. air compressor was already owned. Previously the removal of grit by hand required six man-days of labor per week and the mixture of grit and sewage solids was very objectionable for the men to handle.

With the apparatus shown, grit and solids are recirculated for a time and the grit separated from the solids, which are then flowed into the settling tanks and then the grit is removed by the air-lift pump. The air-lift system cleans and removes the grit in about 30 min. This method of grit removal would be even more efficient if a 200-cfm. air compressor were available for the work. The size of the material that will flow up the air-lift pump is astonishing; it will handle large towels and other similar material with ease. The above information is furnished by Nelson M. Fuller—*Compressed Air Institute, New York, N. Y.*

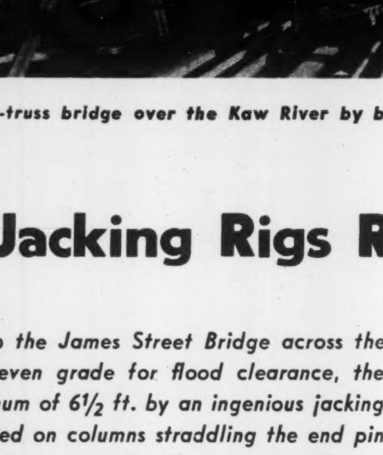




Jacking rig for raising three-truss bridge over the Kaw River by bootstrap arrangement of yokes.

Bootstrap Jacking Rigs Raise Bridge

Contents in brief — *In leveling up the James Street Bridge across the Kaw River in Kansas City, Kan. to even grade for flood clearance, the three-span trusses were raised a maximum of 6½ ft. by an ingenious jacking arrangement. Hydraulic jacks supported on columns straddling the end pin connections lifted the trusses through straps engaging the truss pins. Straps could be pinned to jack supports while resetting the jack. Raising was part of a bridge repair program following a severe deck fire.*



Hand-operated individual hydraulic jacks gave perfect control of lifting operations. The horseshoe shims piled on floor were inserted around jack rams as safety measure during lifting.

METHODS departing from the usual jacking procedure were developed for raising the old James Street Bridge across the Kaw River in Kansas City, Kan., for additional flood clearance. Instead of placing the jacks below the shoes or bottom chords, the contractor supported hydraulic jacks on yoke frames set at the ends of the trusses and lifted the spans through a bootstrap arrangement of yokes. The yoke straps, engaging the truss end pins, were perforated to permit pinning the straps to the jacking frame while the jacks were reset for a new lift and for resetting the jacking beams. The three-span structure, originally built on a grade, was lifted a maximum of 6½ ft. at one end to bring the deck to even grade.

The bridge, owned by Wyandotte County, consists of three spans of three through pin-connected trusses each, carrying two roadways. One lane, 24 ft. between trusses, carries a double-track street railway only; the other lane, 26½ ft. between trusses, is a vehicle roadway. A 4½-ft. sidewalk is carried outside of the trusses along the road lane. The center span is 284 ft., the two side spans are 237 ft.

Several months ago the roadway deck was destroyed by a fire that damaged the floorbeam system. The street railway lane was not severely damaged, and street car traffic was soon restored. However, the roadway was closed pending major repairs to the floor system. In making plans for repairs the county decided to incorporate them in a program of raising the structure to comply with a request of the U. S. Army Engineers for more flood clearance. This additional clearance could be provided by leveling up the bridge from its original position on a grade.

To bring the structure to even grade required raising the spans 6½ ft. at the east abutment, 4 ft. 5⅜ in. at the east pier and 2 ft. 0⅜ in. at the west pier. The west span at the west abutment was not disturbed. Weights lifted by the jacks varied from 80 to 295 tons as shown in the accompanying drawing.

In designing the jacking arrangement the contractor wanted to get away from the cumbersome, orthodox

edure of jacking and blocking
st the shoes or lower chords,
because a simpler method was
ed, but more important, to clear
pace beneath the shoes for inser-
of new shoe supports. These re-
ements were met by building a
tural frame across the east end
he east span and between the
r and side spans, resting on top
e piers and east abutment. Only
set of jacking frames was built
the piers, this set being moved
the west to the east pier.

ese frames consisted of four col-
s straddling each of the end pin
s, except that on the piers one set
olumns served each pair of adja-
trusses. On the top of each
f columns was a grillage for sup-
ting the hydraulic jacks. The jacks
d against a jacking plate that was
med into a top set of grillage. The
grillage was bolted to double per-
ated yokes bent around the end
s as lifting straps. These straps
sed through pairs of perforated
nnels, set back to back with clear-
e between them, that were part of
lower grillage on top of the col-
ns. The straps could be pinned or
ted to these channels to hold the
d while the jacks were being reset.
kewise, the top grillage was bolted
the straps, and could be discon-
cted, lowered and rebolted for a
w hitch for another jack lift. The
ks of 250 and 500 tons capacity
d a lift of about 16 in.

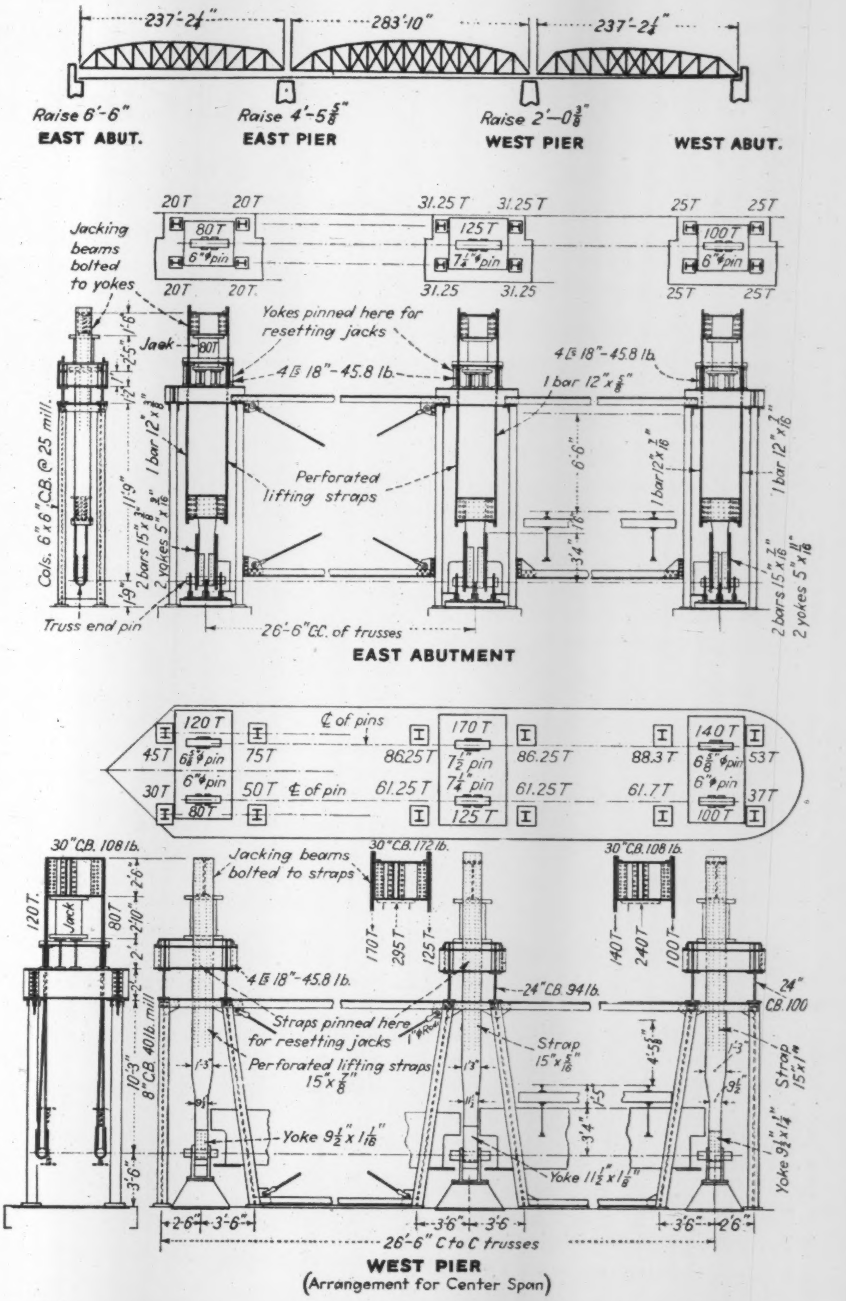
As a safety measure the contractor
erted a series of ⅜-in. horseshoe
ims around the jack rams as the
ms extended during the jacking
erations. The space between the
k collars and jacking plates was
pt filled with the shims so in case
failure of the hydraulic line the
ad would not drop over ⅜ in. In
me cases the shims carried the load
hile the new shoe supports were in-
rted. Also in some cases instead of
king time to pin the straps to the
wer grillage the load would be low-
red onto a block while the jacking
eams were reset.

Jacking procedure

All jacking had to be done on Sun-
ays, the only time the street car
ervice could be interrupted. Jacking
rames were set up first at the east
butment and the west pier. The spans
ere raised first at the west pier to
he full lift of 2 ft. 0⅜ in. Then the
east end was raised in stages to the full lift at that point of 6½ ft. Next the rigging was moved from the west pier to the east pier and the spans at that point were raised to their full lift of 4 ft. 5⅝ in. Temporary blocking kept the street car lines in operation between lifts.

A roadway of open mesh steel and a concrete sidewalk were installed. Also the new shoe supports were encased in new concrete pedestals.

The work was done for Wyandotte County, Kans., for which Frank M. Holcomb is chairman of the board of commissioners. Sverdrup and Parcel, St. Louis, were consulting engineers, with Louis McDaniel as resident engineer. Wm. J. Howard, Inc., Chicago, was contractor; Steve MacEachern was superintendent in charge. Richard T. Logeman was consultant on jacking arrangements.


237'-2¼"
283'10"
237'-2¼"
Raise 6'-6"
EAST ABUT.
Raise 4'-5⅝"
EAST PIER
Raise 2'-0⅜"
WEST PIER
WEST ABUT.
20T
80T
6" pin
31.25 T
125T
7¼" pin
25T
100T
6" pin
Jacking beams bolted to yokes
Jack
80T
Yokes pinned here for resetting jacks
4 [18"-45.8 lb.
1 bar 12"x⅝"
Perforated lifting straps
Cols. 6"x6" C.B. @ 25 mill.
1 bar 12"x⅞"
2 bars 15"x½"
2 yokes 5"x11/16"
6'-6"
3'-4"
Truss end pin
26'-6" C.C. of trusses
EAST ABUTMENT
120T
170T
140T
℄ of pins
45T
75T
86.25T
88.3T
53T
30T
50T
℄ of pin
61.25T
61.7T
37T
6⅝" pin
7½" pin
7¼" pin
125T
100T
30" C.B. 108 lb.
30" C.B. 172 lb.
Jacking beams bolted to straps
120T.
Jack
80T
170T
295T
125T
140T
240T
100T
4 [18"-45.8 lb.
24" C.B. 94 lb.
24" C.B. 100
Straps pinned here for resetting jacks
Perforated lifting straps 15"x⅞"
Strap 15"x⅝"
Strap 15"x1"
8" C.B. 40 lb. mill
Yoke 9½"x1 1/16"
Yoke 11½"x1⅛"
Yoke 9½"x1¼"
3'-6"
2'-6"
26'-6" C to C trusses
WEST PIER
(Arrangement for Center Span)

Details of jacking assemblies. East abutment installation was for one end of trusses only; at the piers the jacks picked up ends of adjacent trusses together.

Strength of Steel Anchors in Concrete

Harry E. Graham
Structural Engineer, Robert & Co.,
Corpus Christi, Texas

***Contents in Brief**—Round and square 1¼-in. bars were embedded in concrete at distances varying from 10 to 40 in. and then pulled out with a hydraulic jack. Tables listing results of tests are given and general conclusions reached are made available.*

HOW TO ANCHOR new structures economically to old concrete where the potential load on the anchors is large is a problem that has received little attention. For small loads there has been considerable work and there are a number of commonly used methods that appear to be entirely satisfactory, both from the theoretical and the practical point of view. However, for large loads little information is available and in an effort to be on the safe side the average engineer adopts anchorage methods that are expensive and probably little stronger than a simple and cheaper one.

To obtain specific data 1¼-in. round plain bars and 1¼-in. square, deformed bars were embedded in old concrete and tested. The bars were embedded in 2⅜-in. dia. holes prepared with a pneumatic drill, and to four different depths, 10, 20, 30 and 40 in., equal to 8, 16, 24, and 32 diameters, respectively, were used. Three different methods of support were employed, namely, horizontal bars in grout, bent bars in holes at 1:8 slope in grout, and horizontal with the hole packed with lead wool. A single test was made with a commercial preparation mixed with the mortar, but bond failure occurred with a lower value than obtained from plain cement mortar.

Tests under field conditions

The method of testing the anchors is shown in Fig. 1. As the drawing shows, two bars were loaded at the same time, thus a single bad bar would give a test value lower than the average.

The tests were deliberately made under field conditions, rather than under the more ideal conditions possible in a laboratory. The concrete was massive, non-reinforced construction several years old but in excellent condition.

Actual results per pair of bars, rather than a computed value per bar, are given in Table I, which also gives a comparison of the resistance per inch of circumference of the bars. With the bars embedded in mortar, a 1:1 mix of ordinary cement and screened beach sand was used. The mortar was seven days old when the tests were made, as was the lead wool. The wool was well rodded.

In Tests 1, 4, 10, and 12 the failures were in a single bar. In the other tests the two failed more or less together. In general all bars showed a failure starting at the edge of the concrete and progressing inward; the apparatus employed did not have sufficient length of travel to pull the bars completely out.

When the slip value was reached and the bars began to pull out, the gage remained practically steady at the maximum pressure. Thus, for the full 4-in. stroke of the jack the bars had almost the same resistance and they were still firmly embedded at the end of the tests.

In general the horizontal bars held in bond and caused the grout to fail. For the sloping bars, with the exception of Test 11, the concrete cracked off below the bars to start the failure and then grout failed just as for the horizontal ones. The plain bars in the compacted lead wool failed in bond. In the case of the deformed bars the lead failed, pulling away from the concrete, giving a wooly appearance.

Conclusions reached

The tests described were not elaborate enough to be useful in figuring exact values for a large range of bar sizes but certain conclusions can be drawn. These include:

1. Beyond a certain minimum depth, an increase in embeddment will give little or no increase in strength.

2. A bent bar in a sloping hole

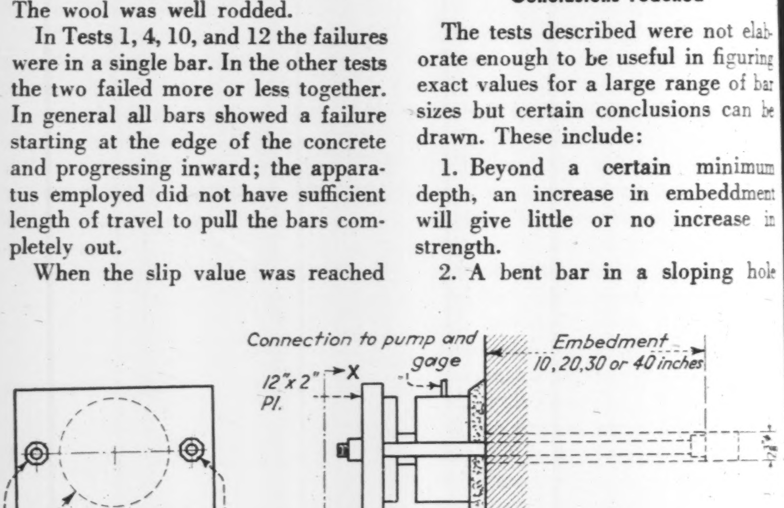


Fig. 1. Method of applying the load to the bars to be tested. Note the initial failure with the bentbars.

TABLE I—RESISTANCE OF BARS TO WITHDRAWAL.

Values under A denote resistance in kips per two-bar unit and values under B are loads in kips per inch of bar circumference.

	1 ¼-in. Round, Plain Bars									1 ¼-in. Square, Deformed Bars								
Embedment, Inches	Test No.	Horiz. Bars 1:1 Grout		Test No.	Bent Bars 1:8 Slope 1:1 Grout		Test No.	Horiz. Bars Compacted Lead Wool		Test No.	Horiz. Bars 1:1 Grout		Test No.	Bent Bars 1:8 Slope 1.1 Grout		Test No.	Horiz Bars Compacted Lead Wool	
		A	B		A	B		A	B		A	B		A	B		A	B
10		....	....		....	....	6	9.8	1.3		....	....		.....	.....	14	33.3	3.3
20		....	....	3	49.1	6.3	7	3.9	0.5	8	117.8	11.8	11	104.1	10.4	15	33.4	3.3
30	1	39.3	5.0	4	49.1	6.3		.....	.....	9	121.7	12.2	12	58.9	5.9		.....	.....
40	2	74.6	9.5	5	43.2	5.5		.....	.....	10	115.8	11.6	13	25.5	2.6		.....	.....

ill usually give a lower value than ne embedded to the same depth in horizontal hole.

3. For the same surface area the eformed bars show considerably greater strength than the plain bars.

4. Compacted lead wool will not give satisfactory results for large loads.

5. When a 1¼-in. square deformed bar is embedded 20 in., the full strength of the bar will be developed. Possibly other experiments might show that even this depth could safely be reduced.

Asphalt Paving on 2 to 1 Slope Rolled with Aid of Tractor

An effective method of placing sphalt lining in a reservoir was used ecently by the Los Angeles Bureau of Water Works & Supply in sealing off the inside of a small terminal torage reservoir at the end of a 7-mi. onduit that discharges into domestic and irrigation supply mains. The eservoir, whose capacity is 9.5 acre-ft., was formed by a 33,000-cu.yd. xcavation and a 24,000-cu.yd. compacted embankment.

Excavation was carried a minimum of 3 ft. below finished grade and horizontally an extra 7 ft. After tests were made carefully to determine just what available mixture of sand, gravel and sandy clay would make the most compact embankment, most of the material for the compacted fill was handled twice to ensure thorough mixing. An 11-ft. width of the fill was placed as a blanket on the excavated slopes and then 4 ft. (horizontal width) was trimmed off to leave the desired 7 ft. as a firmly compacted foundation for the paving.

The same trimming procedure was used on the sides of the reservoir formed by compacted fill. The upper 6 in. of loose soil left by the sheepsfoot rollers was removed from the entire bottom to obtain a firm paving base.

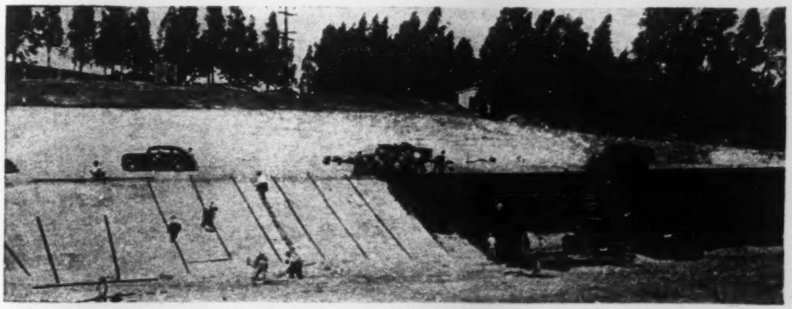
Paving on both side slopes and bottom consists of 4 in. of asphaltic concrete placed in two 2-in. layers. Each layer was first rolled with a light hot roller and then with a cold roller weighing 2,000 lb. per lin.ft. The hot rolling smoothed and conditioned the surface so that the heavier roller operated without picking up material from or gouging into the plastic surface.

On the side slopes, which are 1½ to 1 and extend to a height of 22 ft., the rolling was done with rollers moved up and down by means of hoists mounted on small tractors, which moved along the top of the slope. As gravity returned the roller to the bottom of the slope quite as readily as the hoist raised it to the top, paving on the side slopes was rolled as speedily and as effectively as was that on the reservoir bottom.

After rolling of the paving was completed, a neat cement coating was brushed over the asphaltic concrete to fill surface voids and to provide a smooth surface that will be easier to clean when the reservoir is emptied for that purpose.

An important function of this cement coating, according to the designing engineer, is "to prevent the breaking down of the asphalt that occurs when a thin film of clay or silt is allowed to dry on an asphalt surface." About 7 percent of calcium chloride was added to the cement mix to speed up the setting and to retain moisture during the setting period. That no measureable seepage from the reservoir has occurred is ascribed to the lining of the entire inside of the reservoir with compacted fill.

The work has been done under the supervision of H. A. Van Norman, chief engineer and general manager, Bureau of Water Works and Supply, Los Angeles.



Rollers compacting this asphalt paving on a steep slope were operated effectively by a tractor at the top of the slope.

TVA Saves Steel with Cantilever Forms

Josef C. Patchen

Office Engineer, Douglas Dam Construction, Tennessee Valley Authority

Contents in brief — *Saving steel and reducing carpenter shop work were the principal factors in TVA's decision to use cantilever forms for the mass concrete on Douglas Dam. TVA, heretofore an exponent of forms tied at the top by a diagonal rod, or strut and rod, will save 1,000 tons of steel on this project. The designer of the form describes this new development. (TVA will use cantilever forms, differing somewhat in detail, on its 2,600,000 cu.yd. Fontana Dam just getting under way. — Editor)*

THE TENNESSEE VALLEY AUTHORITY is using cantilever forms for concreting the 536,000 cu.yd. Douglas Dam after placing nearly 8,000,000 cu.yd. of concrete in 15 dams using other types of forms. The cantilver type adopted uses a "hog" rod to take some of the thrust and reduce the deflection and weight of the forms. Saving of steel and reduction of carpenter work, resulting in speedier start of construction, were the primary reasons for adoption of the cantilever form.

On all dams previously constructed by TVA a wood panel form has been used, held at or near the top by a diagonal tie. In earlier dams this was a tension tie supplemented by a strut to hold the form to alignment. For later construction, at Chickamauga, Watts Bar, Hiwassee, and Cherokee dams, a single ring of forms was used with a steel channel wale at the top of the form and another at the bottom for the lower row of anchors. The diagonal to the top took the form of a combination tension tie and strut made from a single piece of second-hand pipe.

This scheme reached a point of high perfection at Hiwassee where provision was made for setting b template the anchors necessary to ti the top of the form and the top clam was made movable to accommodat any spacing of the anchor. A conservative estimate of the steel save by adopting the cantilever form instead of the type used at Hiwasse is 1,000 tons. In addition, second hand pipe has become very scarce The steel saved, used as reinforcing would be almost enough to buil another dam of design and size similar to Douglas.

The rapid start of constructio planned for Douglas Dam was another reason for developing and usin a form that would eliminate as muc work as possible in the carpenter an machine shops. The time required t make complicated top wale clamps pipe templates, struts and anchor had to be given to other work necessary for a speedy start on the entire dam. The forms were to be raised

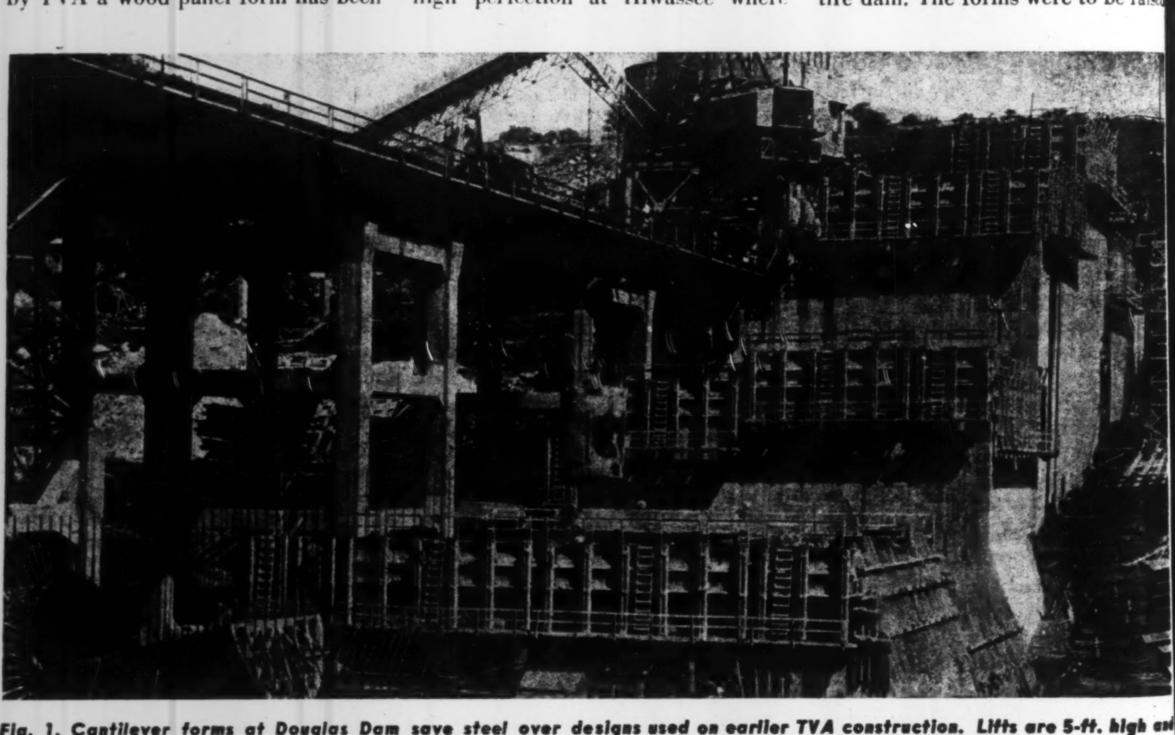
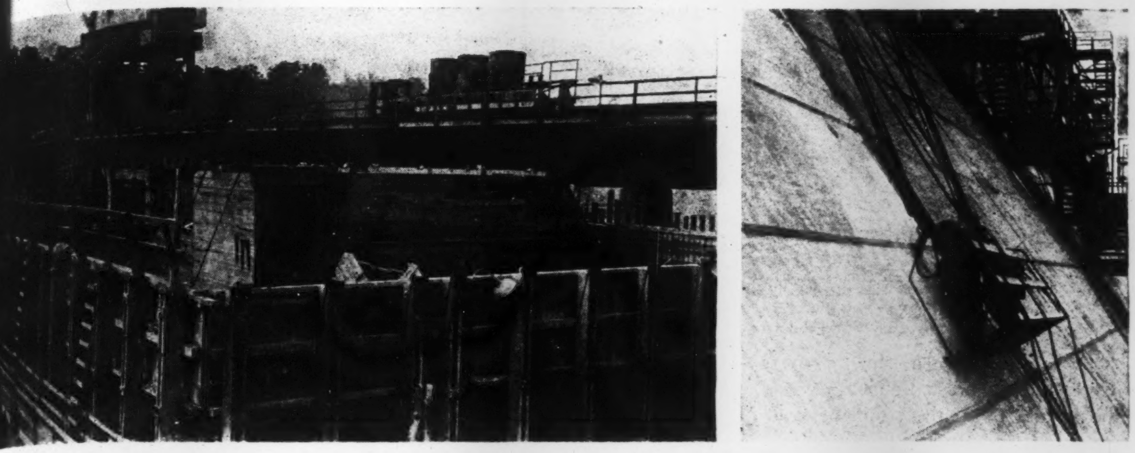


Fig. 1. Cantilever forms at Douglas Dam save steel over designs used on earlier TVA construction. Lifts are 5-ft. high an form is designed for full fluid head. A rapid start of construction resulted from simplified carpenter work.



g. 3. Typical of upstream face and bulkheads formed with cantilever forms (left); and smooth face of the concrete on downstream side of the dam after stripping cantilever panels.

second-hand A-frames of limited ad capacity, making it necessary at the forms be kept to a low weight. ther factors affecting the decision use the cantilever forms were ease timber fabrication, speed in raising and aligning, economical maintenance and cost per square foot of nished concrete surface.

Vertical wales, horizontal studs

The cantilver design used has doule vertical wales at 5 ft. c. to c.; ree horizontal studs—top, middle nd bottom of the 5-ft. lift; and two yers of 1$\frac{5}{16}$ in., net, D&CM sheathng. The layer of sheathing against e studs is vertical to carry the load mposed by the concrete and the yer in contact with the concrete is orizontal to provide pleasing archictural lines.

Three general designs were made or the job, one for the 5 ft. lift on ertical blocks such as the upstream ace and the construction joint, another for forming the sloping downtream face of the dam, and a "special" corner cantilver arrangement or forming square cornered shafts nd stair wells within the dam.

Details of the upstream and bulkhead forms are shown in Fig. 2. The -in. round "hog" rods are used to give a truss action to the vertical wales, thereby reducing the size and weight of the form. A steel bearing plate is placed on the lower horizontal stud to provide a bearing for the $\frac{5}{8}$-in. round rods and it also serves as a bearing for the weight of the form when it is raised to new position.

The top bolt, A-1, is merely a template bolt to hold the anchor for the next lift. The anchor A-2 carries the tension load, computed at 13,500 lb., and is a 1-in. round bolt of S.A.E. 1040 steel that has a minimum yield point of 58,000 psi. Embedded anchors are 15 in. long double loops of $\frac{3}{8}$-in. wire attached to a coil that serves as a rapid thread for the bolt.

The bottom anchor, A-3, is threaded almost full length to allow easy alignment by screwing or unscrewing the nut on either side of the vertical wales. To strip the form, anchor A-3 is removed from the concrete. To save time by not having to "back-off" on the nut on the inside plate, this plate is slotted so that the anchor bolt may be released by dropping the plate. All bolts except A-2 are mild steel.

Panel forms for the downstream sloping faces of the dam are essentially the same as the vertical face form except that provision is made for the greater height due to the slope. The sections of spillway formed with panel forms vary from a slope of 0.6 to 1 at the bottom to 0.9 to 1 near the crest of the dam and the non-overflow section has a constant slope of 0.7 to 1. The downstream face forms are designed to be used for a 5-ft. lift on any of these slopes by making the top and bottom anchor bolts adjustable as to height, while the middle anchor remains fixed.

Two panel forms used in each block

The maximum length of panels used was one-half the width of one concrete monolith, in this case about

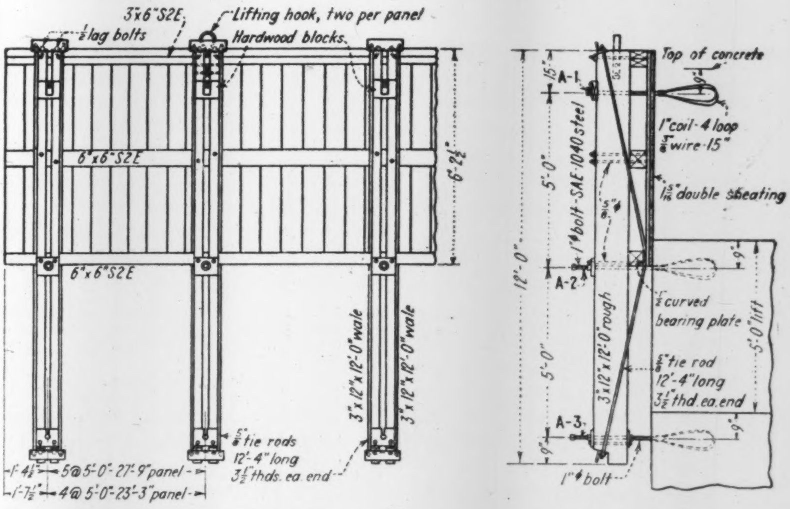

3"x6" S2E
½ lag bolts
Lifting hook, two per panel
Hardwood blocks
6"x6" S2E
6"x6" S2E
6'-2½"
3"x12"x12'-0" wale
3"x12"x12'-0" wale
⅝" tie rods
12'-4" long
3½" thds. ea. end
1'-4½"
5@5'-0"-27'-9" panel
1'-7½"
4@5'-0"-23'-3" panel
Top of concrete
9"
15"
A-1
1" coil-4 loop
⅜" wire-15"
1$\frac{5}{16}$" double sheating
5'-0"
1" bolt-SAE-1040 steel
⅝"
12'-0"
A-2
9"
½" curved bearing plate
5'-0" lift
5'-0"
3"x12"x12'-0" rough
⅝" tie rod
12'-4" long
3½" thd. ea. end
A-3
9"
9"
1" bolt

Fig. 2. Typical upstream and bulkhead panel form designed for 5 ft. head of fluid concrete; 15-in. double loop anchor is based on use of medium low-heat cement and a minimum 72 hr. before stripping and resetting bolts to carry cantilever load.

28 ft.; thus two panel forms per block were used on the upstream and downstream faces of the dam. On the contraction joints shorter lengths were used to accommodate changing lengths required as the concrete rises. The weight of an upstream 28-ft. long form is about 3,750 lb. and for a downstream form 4,750 lb.

Design depends on size of job

The cantilver form has proven entirely satisfactory. Deflections are minor under load; the resulting concrete face is smooth and within allowable tolerance. Several improvements could be incorporated in future designs depending on the size of the job and the anticipated number of uses of the panels.

At Douglas Dam it was anticipated that a form would be reused a maximum of thirty times; for a higher dam with a greater number of re-uses it would probably be better to stiffen the form by using 6x8-in. studs instead of 6x6 in. If handling additional weight offered no serious difficulty, the form could further be simplified by increasing th size of the vertical wales and thu eliminating the need for the "hog" rods.

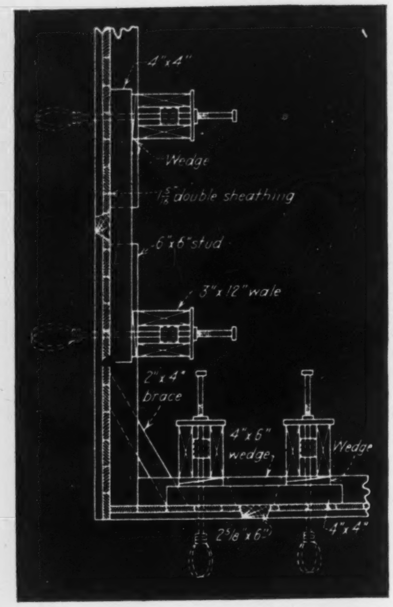


Fig. 4. Plan of cantilever form for shafts. Vertical section is similar to Fig. 2 except that four horizontal studs are used with a 4x4 in. timber laid across the open vertical joint and wedged against the wales.

The most likely point for troubl in wood forms of this type is th possibility of varying deflection caused by use of different grades o lumber. Carefully selected, grade marked lumber for the componen parts of the form will assist in avoiding this difficulty. Proper handling and stacking when not in use, wil add to the life and service of th forms to a considerable extent.

Project personnel

The timber cantilever forms used throughout this project were designed and detailed on the job under the direction of the writer. Many valuable suggestions for designs and details were obtained from Frederick Brandt, assistant construction superintendent at Fontana Dam. Douglas project is headed by Lee G. Warren, project manager. Thomas F. Taylor is construction engineer and James S. Lewis construction superintendent.

War and Postwar Waterworks Needs Will Feature A. W. W. A. Conference

Tentative program plans for the wartime conference of the American Water Works Association, announced last week by Harry Jordan, secretary, focus attention on municipal water service needs now and in the postwar period.

The conference, which will be held in Cleveland, provides for the bulk of the program to be compressed in two days—June 16 and 17. There will be additional sessions, however, for those who find it possible to arrive for the afternoon of June 15 or stay for the morning activities on June 18.

One of the highlights—and a new feature on the program—will be a superintendents' "competition" session in which five prize-winning papers will be read. Superintendents are urged now to submit papers on the topic "How We Met Wartime Emergency Conditions in Our Town". These papers should be planned to include material on the following: How the water plant was made to carry more load; what substitute materials have been used successfully; what changes in meter reading and billing practices have been made and with what results; what reduction in use of automotive equipment for customer and maintenance services have been carried out; what has been done in the way of reducing waste and saving water; and how customers have been kept informed of changes.

The prizes awarded will be in cash amounts of $50, $40, $30, $20, and $10. All of the papers intended for the competition must be offered by title and author by April 25. The complete text of each paper must be mailed to the association's office, in New York City, by May 20.

Postwar planning

Postwar planning and its relation to waterworks will be discussed by Abel Wolman, president of the association, and Willard Chevalier, publisher of *Business Week*. These speakers will open an evening session that is to be devoted to various aspects and conditions of postwar activity.

Other papers scheduled for presentation include a panel discussion of labor relations in waterworks plants along with a review of current personnel problems. Policies of the War Production Board will be outlined by Arthur E. Gorman, chief of the water supply section of WPB, and water supply practice in Army training centers will be reviewed by L. H. Kessler, civilian chief of the water and sewage section of the Repairs and Utilities Branch of the Army.

For those interested in distribution system developments there will be papers on coating materials for cast iron pipe, installation of concrete pressure pipe and field welding of steel water mains. In connection with water treatment there will be an announcement of a new process to remove substances in water that contribute to tooth decay, and a review of federal drinking water standards.

It was urged by Mr. Jordan that all those planning to attend the conference make their train reservations—both going and returning—at the latest by May 12. Headquarters for the conference will be the Statler and Carter Hotels.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Layout of Pipe on Curves

Field engineers who have experienced difficulty in getting radius pipe to follow the trench will be interested in a layout method developed by the Essex County Highway Department, Newark, N. J. Invariably, in the past before getting very far beyond the P.C., it was found that the radius pipe began cutting in toward the inside of the curve. At once the stake-out and the drop was checked for error, but in most instances they were found to be as required, yet the pipe failed to follow the trench properly. With a little cussing at the pipe manufacturers and the pipe laying gang, the job proceeded by the art of "fudging" and the completed job was anything but first class, having open joints, irregularities in alignment, and additional manholes.

One job in particular, entailing the installation of a large diameter pipe on a relatively short radius, which was to be laid to a very definite alignment, caused no end of trouble and embarrassment. Thus, it was decided to investigate and analyze the art of radius pipe layout. The results are shown by the accompanying drawing.

The study disclosed two basic reasons for encountering difficulties. First, the procedure had been to select a suitable radius for a given job, but without giving due consideration as to whether the length of the theoretical curve contained an even number of pipe lengths, with due allowances for the "make" and "drop." Apparently no attempt was made to approximate the requirements of a true curve as regards even pipe lengths. Hence, Δ, R. and L were not always in agreement.

Secondly, as indicated on the drawing, the pipe sections, which were heretofore accepted as being chords of a curve, are actually tangential elements. Thus, they will not follow the required theoretical curvature if the joint is made to fall at the true P.C., as is customarily the case. To begin the first section of radius pipe exactly at the P.C. is erroneous and will cause the pipe to cut in as much as one-half of a pipe length in going through a 90-deg. arc. In order to correct this, the first section of radius pipe should begin one-half of a pipe length beyond the P.C. and the last section of radius pipe will extend one-half of a pipe length beyond the P.T. In this manner the radius pipe will follow a true curve exactly.

The foregoing conclusions may seem somewhat theoretical and impractical for application on the average pipe job. However, its principles have definite value in laying large diameter pipes on relatively short radii where tight joints and strict adherence to alignment are prerequisites.—*Herbert C. Buerkle, assistant civil engineer, Essex County Highway Department, Newark, N. J.*

(*Continued on next page*)

$$\tan\alpha = \frac{4}{R+\frac{D}{2}+T}\ \text{(Approx.)}$$
$$\text{Drop} = (D+2t)\times\tan.\alpha$$
$$L = \text{Number of pipe} \times (4-\tfrac{1}{2}\,\text{drop})$$
$$\Delta = \Sigma\alpha$$

If other than 4 ft. pipe length is used substitution of this length in feet should be made where 4 appears in formulae. Dimensions in formulas are expressed in feet.

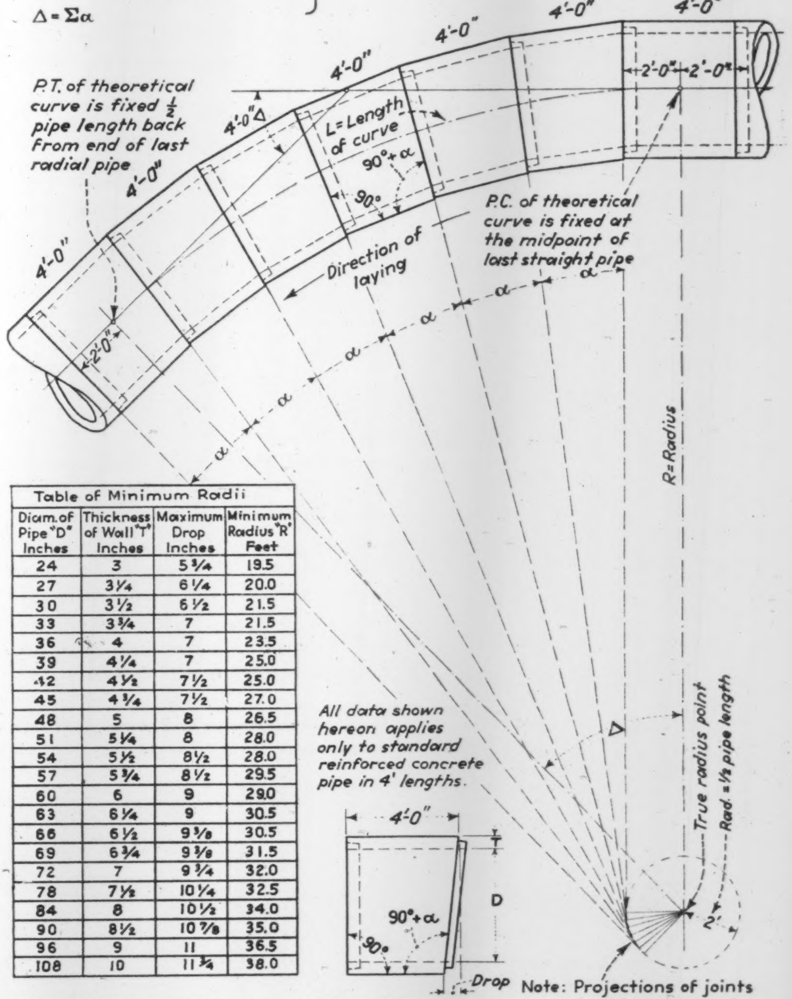


Table of Minimum Radii			
Diam. of Pipe "D" Inches	Thickness of Wall "T" Inches	Maximum Drop Inches	Minimum Radius "R" Feet
24	3	5¾	19.5
27	3¼	6¼	20.0
30	3½	6½	21.5
33	3¾	7	21.5
36	4	7	23.5
39	4¼	7	25.0
42	4½	7½	25.0
45	4¾	7½	27.0
48	5	8	26.5
51	5¼	8	28.0
54	5½	8½	28.0
57	5¾	8½	29.5
60	6	9	29.0
63	6¼	9	30.5
66	6½	9⅜	30.5
69	6¾	9⅜	31.5
72	7	9¾	32.0
78	7½	10¼	32.5
84	8	10½	34.0
90	8½	10⅞	35.0
96	9	11	36.5
108	10	11¾	38.0

All data shown hereon applies only to standard reinforced concrete pipe in 4' lengths.

Note: In selecting curved pipe to suit a particular instance it is necessary that the elements of curve, ie, Δ, R. & L satisfy conditions of true curve in which "L" is in even pipe lengths.

Standard Method of Manufacturing Radius Pipe

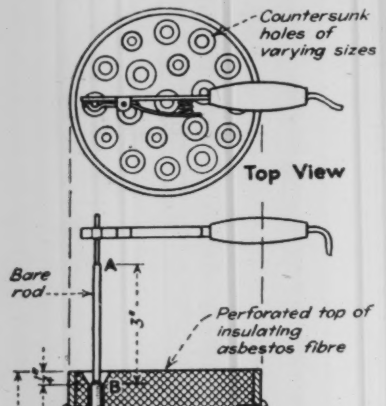
Note: Projections of joints do not converge at common point, but are tangents to a common circle whose diameter is equal to pipe length.

Saving Welding Rod

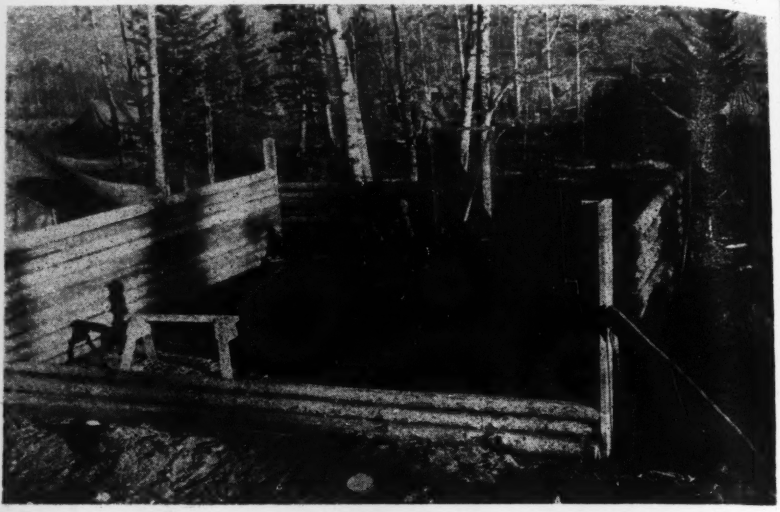
To aid in conserving critical war materials the device illustrated, which is not patented, has been developed. Since normally about 20 percent or 3 in. out of 14 in. of all covered welding rod is wasted because the end must be bare for the rod holder, the device may be very serviceable for certain classes of mass-production flat work and positioned welding.

To save all of the covered rod, the welder need only to position bare stub AB, above a new covered rod in holder as shown, and produce a quick arc at the top of this rod, which will fuse the two pieces together. One 3-in. bare stub may be used for 20 to 30 covered rods. Thus, welders can reduce the use of metals by saving the normally wasted short ends.

To make the job complete manufacturers will need to cooperate by making only 12-in. rods with a full-length flux covering but clean ends. —*C. W. Deans, 3049 W. 27 Ave., Vancouver, B. C.*


Countersunk holes of varying sizes
Top View
Bare rod
A
3"
Perforated top of insulating asbestos fibre
B
Fibre or light metal casing
Covered rod in holder
14"
14¾"
Spacer
Longitudinal Cross Section

Large savings of welding rod are possible if the short bare rod normally thrown away is saved and welded to new rods covered with fuse for full length.



Easy Framing Method For Log Cabins

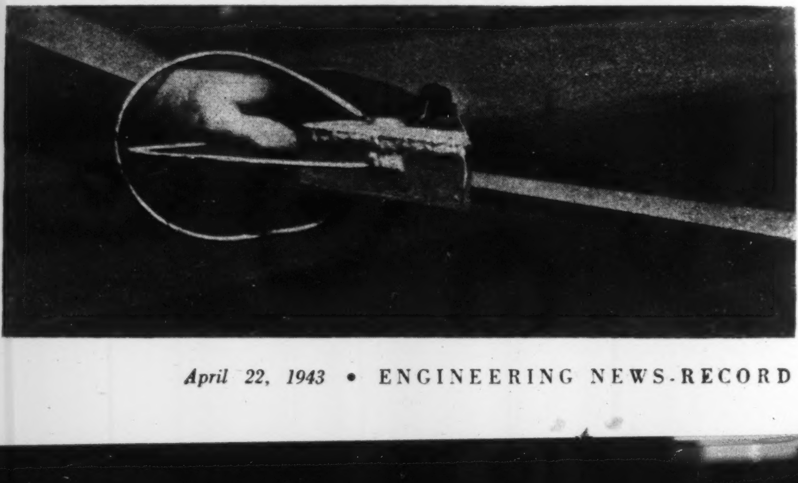
A novel method of framing a log cabin was adopted by the 341st Engineers in building a post exchange at headquarters camp on the Alcan Highway. Instead of notching the logs to fit at the ends, a T corner stud was used as shown in the accompanying photograph. Spikes driven through the stem and flange of the studs held the ends of logs in place.

Safety Guard on Sharp Corners

Some protection is needed for the sharp corners of steel plates and other metal objects that project dangerously along passageways through plants where thousands of workers pass as they go on or off shift. A Western shipyard uses a safeguard at such corners that is quickly and easily attached or removed and is so arranged that the risk of injury to a hurrying or crowded employee is eliminated.

The device, shown in the accompanying picture, is a welded-up steel "corner" to which heavy wire loops are attached in planes at right angles to one another. A bolt through a threaded hole on the inner side of the device makes it easy to clamp down on the projecting plate corner, holding the safeguard firmly in place. White paint serves to make the safeguard stand out prominently.

Metal corners, with stiff wires bent into a smooth curve, are bolted on projecting plate edges for greater safety for pedestrians.



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3 Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.

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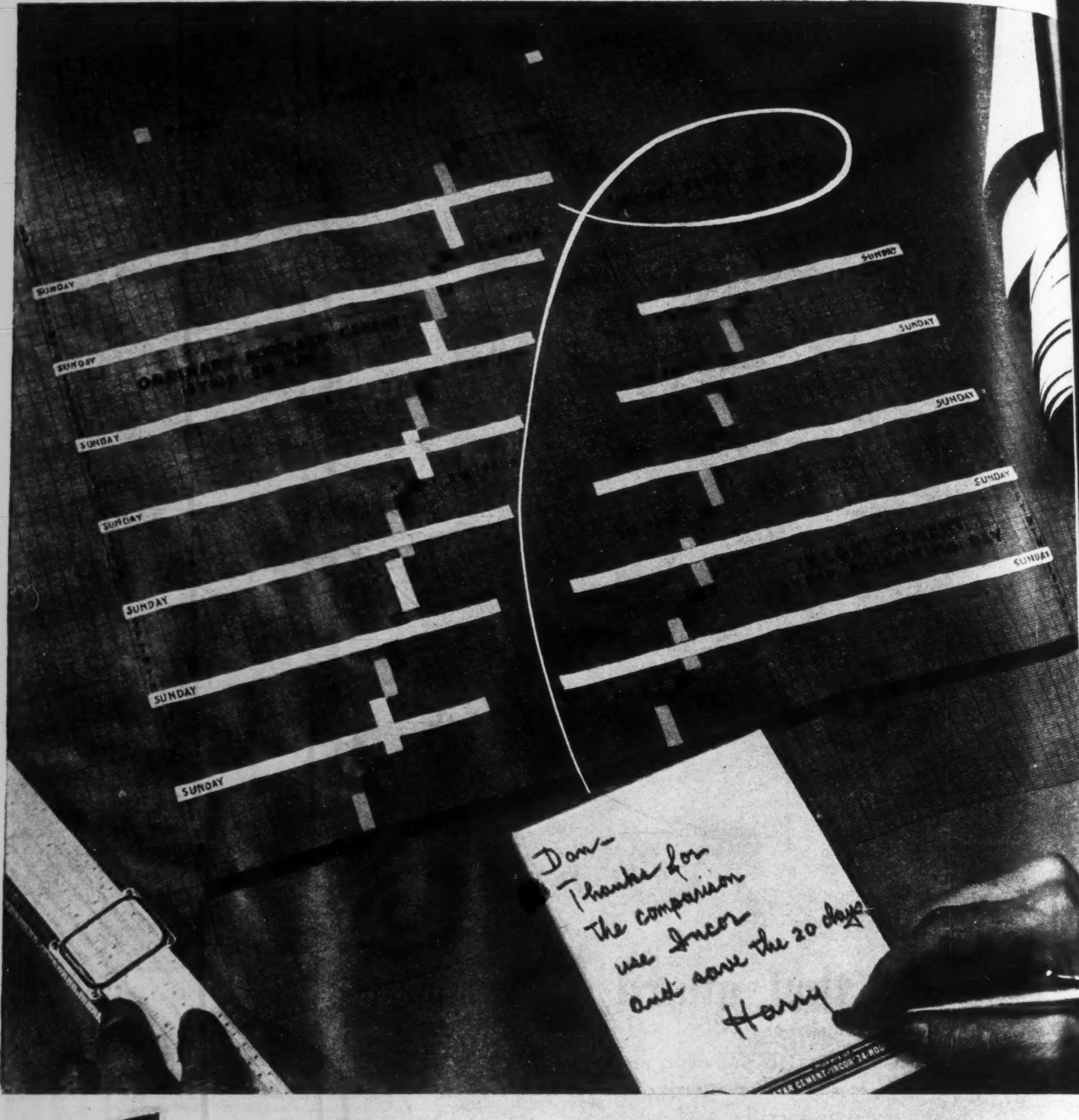
If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.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the comparison
use Incor
and save the 20 days
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ENGINEERING NEWS-RECORD

Construction COSTS

INDEX—1943 EDITION

Introduction—A Review of 1942 Costs 91
ENR Cost Indexes 92
Special Building Cost and Volume Indexes 94
Railroad Cost Index 98
Public Utility Construction Cost Index 100
Boeckh Building Cost Index 102
Bond Interest and Money Rates 104
Compensation Insurance Rates 106
Prices of Construction Materials 109
Construction Wage Rates 124
Equipment Rental Rates 132
Digest of OPA Maximum Price Regulations 134
Army Equipment Pool 136
Depreciation Schedule—U. S. Bureau of Internal Revenue 142
Cost Comparison of Wood, Concrete and Steel Warehouses 146
Roadbuilding Costs 150
Publicly-financed War Project Costs 152
Municipal Building Costs in New York City 152
Highway Maintenance Costs 152
FPHA War Housing Cost Data 154
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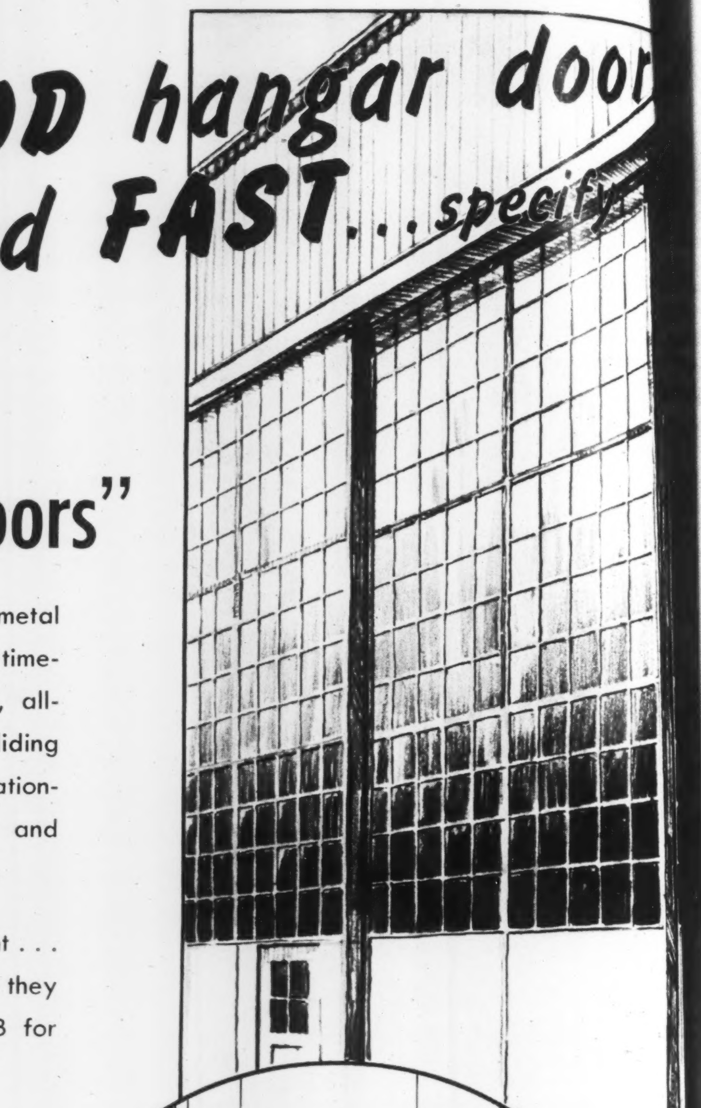
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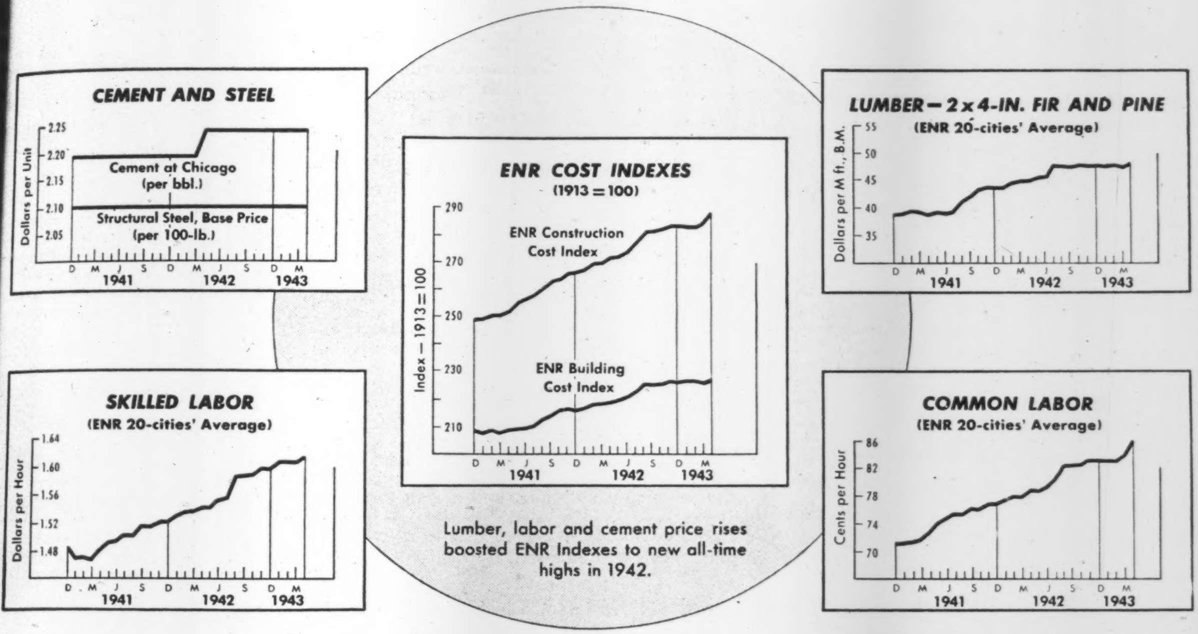


Lumber, labor and cement price rises boosted ENR Indexes to new all-time highs in 1942.

CONSTRUCTION COSTS, as measured by visible cost factors, rose gradually during 1942, at a noticeably slower rate than was evident in other branches of the nation's industrial economy. In the construction field, costs increased 6 percent during the year due to a 9.6 percent rise in the lumber component, a 7.2 percent increase in common labor, and a 2.3 percent gain in the cement factor of the *ENR* Construction Cost Index. Skilled labor, which is used in the *ENR* Building Cost Index, was 4.4 percent higher than at the outset of 1942.

Hourly labor rate averages in 26 manufacturing industries climbed more rapidly than those reported for construction in 1942. The skilled and semi-skilled average hourly rate was up 11.0 percent, and common labor gained 10.6 percent, according to National Industrial Conference Board statistics.

Construction material wholesale prices averaged 6.8 percent more in 1942 than in the preceding year, according to the Bureau of Labor Statistics Index of Wholesale Prices. Farm products, foods and textiles, however, rose at a faster pace, and were 28.5, 20.4 and 14.3 percent higher, in that order, than in 1941. The combined index for all commodities was 13.2 percent above the preceding year.

The *ENR* Construction Cost Index, based on labor and material price quotations, averaged 276.31 for 1942, the highest annual value ever reported. It tops the former record of 1941 by 7.2 percent, and is 10.0 percent above the long-standing mark of 251.28 established in 1920. The December, 1942 index value, 283.69, was the highest on record, and exceeded the pre-war high of June 1920 by 3.6 percent.

However, in addition to the visible changes in construction material and labor price quotations recorded by the *ENR* Construction Cost Index, invisible cost factors continued to add to contractors' costs. Among these unmeasured costs are: the lower efficiency of the present labor in the construction field; increased use of overtime to complete work within the rush schedules set for war work; increased freight costs to enable contractors to obtain materials available only at distant points; higher costs encountered in using substitute materials to complete projects; delivery delays; and also the willingness of some builders to pay premium prices to obtain scarce materials.

In the first two months of 1943, the *ENR* Construction Cost Index remained practically unchanged from the 1942 year-end value, but in March the index value climbed to 285.24, and in April, to 288.80, a new record high. The virtual freezing of wages and prices at present levels as contained in the President's Executive Order of April 7, however, may have the effect of holding construction costs steady at the highs now prevailing.

ENR Construction Cost Index

THE ENGINEERING NEWS-RECORD Construction Cost Index has four components: (1) structural steel shapes, base price; (2) cement at Chicago; (3) lumber, which until 1935 was 12 x 12 long leaf yellow pine wholesale at New York, and since 1935 is 2 x 4 S4S pine and fir in carload lots, *ENR* 20-cities average; (4) common labor, *ENR* 20-cities average of wage rates in force.

The weighting for the original price series is given in the following computation for December, 1934:

Steel 25 cwt. x 1.80 = 45.00
Lumber 0.6 x 61.00 = 36.60
Cement 6 x 2.00 = 12.00
Labor 200 x .5413 = 108.26

Index 201.86

The weighting for the new lumber price series is 1.088, and the computation for January, 1943 index is:

Steel 25 cwt. x 2.0675 = 51.69
Lumber 1.088 x 47.72 = 51.92
Cement 6 x 2.24 = 13.44
Labor 200 x .832 = 166.40

Index 283.45

This Construction Cost Index is designed to predict changes in construction cost trends and to measure the movement of construction costs in general. It is not intended to apply to any specific class of construction or to a particular locality.

ENR Building Cost Index

In practice, the construction cost index has been used widely to apply

Engineering News-Record BUILDING Cost Index—1913 = 100

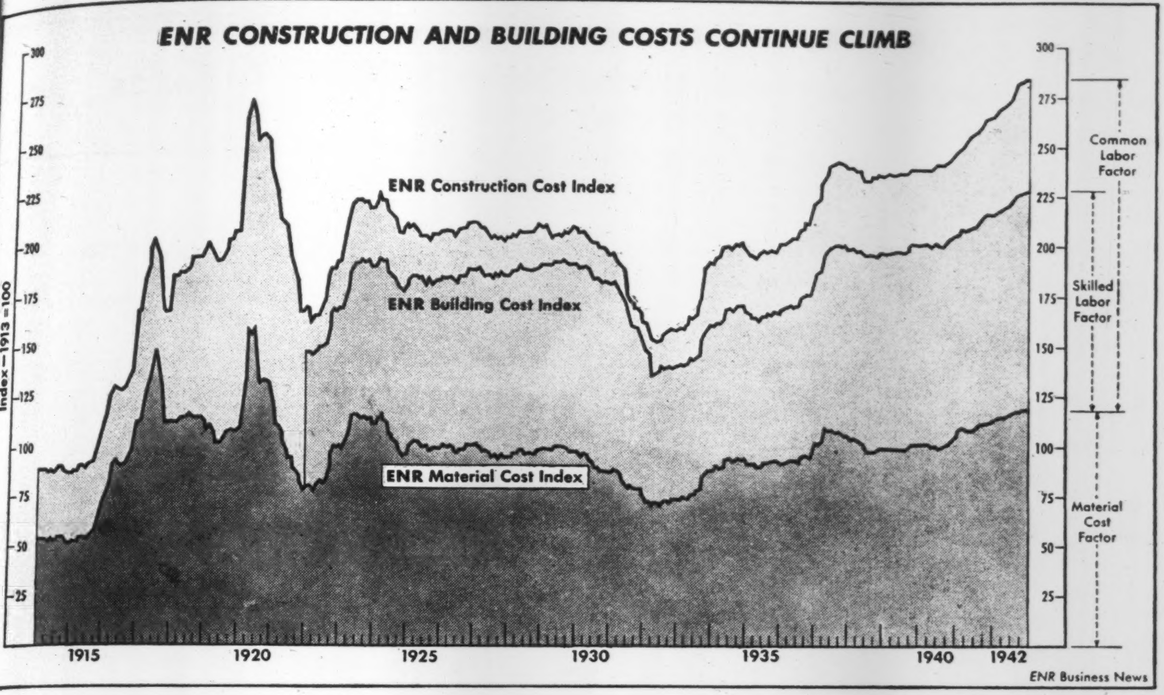
Yearly Aver. 1910 to 1922			1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935†	1936†	1937†	1938†	1939†	1940†	1941†	1942†	1943†
1910....	96.4	J	168.2	189.3	182.7	184.3	187.8	185.9	190.0	190.3	180.7	150.6	140.8	160.2	166.5	168.3	185.5	198.6	196.2	201.5	207.9	217.1	226.9
1911....	94.1	F	172.6	191.7	184.5	183.7	189.2	187.2	190.0	188.5	182.0	147.2	141.7	161.3	165.8	168.4	186.6	199.0	196.2	201.5	208.4	218.4	226.9
1912....	91.4	M	178.4	194.1	184.5	184.3	187.3	187.2	190.0	189.2	180.2	145.9	140.8	161.7	164.1	169.7	187.7	199.3	196.5	201.5	207.9	218.9	226.7
1913....	100.0	A	186.0	191.8	184.7	184.1	186.0	188.8	190.0	188.8	177.6	135.7	141.5	163.2	164.4	170.0	195.0	198.2	196.5	201.4	208.6	219.6	227.5
1914....	91.9	M	188.9	192.5	182.8	183.6	185.4	190.1	191.3	187.9	174.6	136.4	143.9	168.2	163.3	170.3	197.2	197.9	196.6	201.2	209.2	220.1	....
1915....	95.3	J	191.3	187.7	183.0	181.8	185.8	187.6	192.0	185.4	172.5	137.6	143.2	168.2	164.9	170.2	199.2	198.2	196.4	201.7	209.4	221.2	....
1916....	130.9	J	191.4	184.5	180.2	184.3	183.9	187.6	192.0	183.3	170.5	139.5	144.3	169.2	165.3	170.9	199.8	194.4	196.8	201.7	210.2	223.5	....
1917....	166.8	A	191.5	183.3	183.0	185.1	186.5	187.6	192.8	183.7	163.1	139.4	145.9	168.4	166.2	173.9	200.7	194.5	196.5	201.7	212.5	225.4	....
1918....	159.1	S	192.2	181.4	180.5	185.1	184.6	187.6	191.6	182.4	159.5	139.6	154.5	170.1	166.1	174.3	200.6	194.8	196.6	203.1	214.6	225.5	....
1919....	158.8	O	191.0	178.4	181.8	188.0	186.6	187.6	190.3	181.8	159.5	140.0	157.1	170.2	167.3	175.3	201.0	195.5	198.5	204.0	215.9	225.9	....
1920....	207.2	N	192.4	176.5	182.4	188.0	185.0	188.0	190.3	181.8	158.3	139.5	159.0	170.2	167.3	175.5	200.3	195.6	201.2	206.2	216.5	226.6	....
1921....	166.1	D	188.0	178.4	183.1	188.0	185.1	190.0	190.3	181.8	155.0	140.0	160.7	170.2	167.2	179.3	200.5	196.1	201.2	208.2	216.4	226.6	....
1922....	154.9																						
		Aver.	186.0	185.8	182.7	185.0	186.1	188.0	190.9	185.4	169.4	140.9	147.8	166.7	165.8	172.2	196.2	196.8	197.4	202.8	211.5	222.4	....

Engineering News-Record CONSTRUCTION Cost Index—1913 = 100

Yearly Averages prior to 1914			1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
		J	89.22	87.12	112.66	167.75	184.51	198.05	206.55	237.08	168.72	191.70	217.90	210.40	207.15	211.50	203.90	209.40	208.96
1903........	93.90	F	89.22	87.36	116.66	167.75	184.51	201.50	225.10	230.67	168.72	197.40	220.30	209.70	206.55	210.15	204.65	210.40	206.46
1904........	87.40	M	88.97	87.66	125.16	175.66	184.51	198.05	240.85	224.27	162.04	205.25	224.70	210.20	207.65	208.80	204.65	207.78	206.80
1905........	90.55	A	87.97	90.16	129.51	183.41	186.01	191.25	265.20	213.07	164.72	213.50	221.60	209.55	207.05	209.00	206.40	203.40	207.12
1906........	95.10	M	88.62	90.16	131.06	187.61	186.01	191.25	268.90	210.82	164.62	216.70	222.38	207.20	207.30	206.80	207.00	205.15	205.86
1907........	100.55	J	87.87	88.96	128.71	199.26	186.31	191.85	273.80	209.82	166.62	220.70	216.85	204.60	204.80	205.55	206.15	205.65	203.36
1908........	97.20	J	88.12	90.51	127.96	204.01	188.65	193.65	265.65	203.82	169.70	222.10	214.40	204.60	207.80	203.68	206.65	204.77	200.95
1909........	90.92	A	90.11	91.76	128.76	198.41	193.85	196.65	252.00	193.47	173.40	221.50	213.15	204.60	208.30	205.50	207.29	205.91	200.95
1910........	96.33	S	90.36	93.01	131.76	190.31	193.85	202.85	255.20	188.27	185.00	221.50	211.25	202.10	208.30	203.60	207.29	207.57	199.58
1911........	93.43	O	88.51	96.16	135.11	167.11	193.85	202.25	255.20	182.57	188.60	220.30	207.55	205.35	209.80	204.40	207.71	206.32	198.72
1912........	90.70	N	87.26	101.06	138.16	166.51	193.55	206.85	255.32	166.32	188.60	220.90	205.70	205.95	210.80	201.98	209.46	208.46	198.54
1913........	100.00	D	86.51	107.06	149.41	167.11	194.75	206.85	251.62	167.82	192.60	217.30	208.58	205.95	210.80	203.90	210.16	209.46	196.86
		Aver.	88.56	92.58	129.58	181.24	189.20	198.42	251.28	201.81	174.45	214.07	215.36	206.68	208.03	206.24	206.78	207.02	202.85

Engineering News-Record CONSTRUCTION Cost Index—1926 = 100

Yearly Averages prior to 1914			1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
	1926 = 100	J	42.9	41.9	54.2	80.6	88.7	95.2	99.3	110.0	81.1	92.2	104.7	101.1	99.6	101.7	98.0	100.6	100.4
		F	42.9	42.0	56.1	80.6	88.7	96.9	108.2	110.9	81.1	94.9	105.9	100.8	99.3	101.0	98.4	101.1	99.2
1903.....	45	M	42.8	42.1	60.3	84.4	88.7	95.2	115.8	107.8	77.9	98.7	108.0	101.0	99.8	100.3	98.4	99.9	99.5
1904.....	42	A	42.2	43.3	62.0	88.2	89.5	91.9	127.5	102.4	79.2	102.6	106.5	100.7	99.5	100.4	99.2	97.8	99.6
1905.....	43.5	M	42.6	43.3	63.0	90.2	89.5	91.9	129.3	101.3	79.1	104.2	106.9	99.6	99.7	99.4	99.6	98.6	99.0
1906.....	46	J	42.2	42.7	61.9	95.8	89.5	92.2	131.6	100.9	80.1	106.1	104.3	98.4	98.5	98.8	99.1	98.9	97.8
1907.....	51	J	42.4	43.5	61.5	98.1	90.7	93.1	127.6	98.0	81.6	106.8	103.1	98.4	99.9	97.9	99.3	98.4	96.6
1908.....	47	A	43.3	44.1	62.0	95.4	93.2	94.5	121.1	93.0	83.4	106.5	102.4	98.4	100.1	98.8	99.6	99.0	96.6
1909.....	44	S	43.4	45.1	63.3	91.5	93.2	97.5	122.7	90.5	88.9	106.5	101.5	97.1	100.1	97.9	99.6	99.8	95.9
1910.....	46	O	42.5	46.2	64.8	80.3	93.2	97.2	122.7	87.8	90.7	105.9	99.8	98.7	100.9	98.3	99.8	99.2	95.5
1911.....	45	N	41.9	48.4	66.4	80.0	93.0	99.4	122.7	80.0	90.7	106.2	98.9	99.0	101.3	97.1	100.7	100.2	95.4
1912.....	43.5	D	41.1	51.4	71.8	80.3	93.6	99.4	121.0	80.6	92.6	104.5	100.2	99.0	101.3	98.0	101.0	100.7	94.6
1913.....	48																		
		Aver.	42.5	44.5	62.2	87.1	90.9	95.3	120.8	97.0	83.8	102.9	103.5	99.4	100.0	99.1	99.4	99.5	97.5



ENR CONSTRUCTION AND BUILDING COSTS CONTINUE CLIMB

ENR Business News

to building costs, and when common and skilled labor rates move in similar trends it is a satisfactory measure of relative building cost movement.

However, following the low wage rates of 1932, common labor climbed much faster than skilled and reached new all-time highs by July, 1937. The increase was in the lower ranges between union and non-union. When "prevailing" wages became synonymous with union wages the gap closed up, hence the *ENR* 20-cities wage average increased more rapidly than the union rates.

To provide a more representative measure of building cost movement, the skilled labor trend has been substituted for the common labor trend in the *ENR* Construction Cost index, and the *ENR* Building Cost index computed. The labor weighting applied to the *ENR* skilled labor average for 20-cities thus becomes 68.38 hr., and the computation for the Jan. 1943 Building Cost Index is:

Steel	25 cwt. x 2.0675	=	51.69
Lumber	1.088 x 47.72	=	51.92
Cement	6 x 2.24	=	13.44
Labor	68.38 x 1.606	=	109.82
Index			226.87

Base Conversion Table

To convert *ENR* Construction and Building Cost Indexes

From
1913 = 100 Base
To Divide 1913 = 100 Values By

	Const. Cost	Bldg. Index
1926 = 100	2.0803	1.8499
1929 = 100	2.0702	1.9086
1910–14 = 100	.9380	.9477
1924 = 100	2.1536	1.8578
1923–25 = 100	2.1204	1.8481
1914 = 100	.8856	.9191
1911 = 100	.9343	.9414

† Based on 2 x 4 S4S fir and pine *ENR* 20-cities' average lumber component instead of 12 x 12 yellow pine wholesale in New York used prior to 1935. For explanation see page C-5 of June 30, 1938 *ENR*.

CONSTRUCTION Cost Index—1913 = 100

1931	1932	1933	1934	1935†	1936†	1937†	1938†	1939†	1940†	1941†	1942†	1943†
194.48	162.48	158.44	191.26	198.22	201.23	221.20	239.62	234.72	238.34	249.69	267.63	283.45
196.61	161.82	159.30	194.06	195.07	201.33	222.05	238.99	234.31	238.32	250.50	269.41	283.48
194.51	157.24	158.44	194.06	194.41	201.63	224.75	238.79	234.43	238.29	250.71	269.71	285.24
191.63	153.12	160.16	195.86	194.65	202.80	231.35	237.95	234.86	238.26	252.40	271.78	288.80
189.33	152.78	164.39	199.61	193.96	204.05	233.45	236.80	234.69	238.86	255.55	272.30	......
187.23	152.20	163.41	199.61	196.73	205.08	237.25	236.86	235.02	241.59	256.79	274.19	......
174.37	153.36	165.50	199.65	197.43	204.80	239.90	232.29	234.94	242.15	258.18	277.65	......
171.38	156.80	167.00	198.40	197.45	208.48	240.65	232.39	234.90	242.18	260.41	281.61	......
171.40	157.96	175.48	200.58	197.30	208.88	241.62	232.70	234.97	244.13	263.12	281.61	......
169.78	159.16	187.74	200.86	197.50	211.53	241.90	234.30	236.86	245.02	264.46	282.44	......
169.28	158.20	190.14	201.36	197.35	211.50	241.40	234.40	238.20	247.24	266.13	283.64	......
166.23	158.46	192.41	201.86	197.20	215.70	241.05	234.89	238.17	249.12	266.16	283.69	......
181.35	156.97	170.18	198.10	196.44	206.42	234.71	235.86	235.51	241.96	257.84	276.31	......

CONSTRUCTION Cost Index—1926 = 100

1931	1932	1933	1934	1935†	1936†	1937†	1938†	1939†	1940†	1941†	1942†	1943†
93.5	78.1	76.2	91.9	95.3	96.7	106.2	114.9	112.9	114.6	120.0	128.7	136.3
94.5	77.8	76.6	93.3	93.8	96.8	106.7	114.9	112.7	114.6	120.4	129.5	136.3
93.5	75.6	76.2	93.3	93.5	96.9	108.0	114.8	112.7	114.6	120.5	129.7	137.1
92.1	73.6	77.0	94.1	93.5	97.5	111.2	114.4	112.9	114.5	121.3	130.6	138.8
91.0	73.4	79.0	95.9	93.2	98.2	112.0	113.8	112.8	114.8	122.8	130.9	......
90.0	73.2	78.5	95.9	94.6	98.5	113.8	113.9	113.0	116.1	123.4	131.8	......
83.8	73.7	79.6	96.0	94.9	98.4	115.1	111.7	112.9	116.4	124.1	133.5	......
82.4	75.4	80.3	95.4	94.9	100.2	115.7	111.7	112.9	116.4	125.2	135.4	......
82.4	75.9	84.4	96.4	94.9	100.4	115.9	111.9	113.0	117.4	126.5	135.4	......
81.6	76.5	90.2	96.6	95.0	101.5	116.1	112.7	113.9	117.8	127.1	135.8	......
81.4	76.0	91.4	96.8	94.9	101.5	115.8	112.7	114.5	118.9	127.9	136.4	......
79.9	76.2	92.4	97.0	94.8	103.4	115.7	112.9	114.5	119.8	127.9	136.4	......
87.1	75.4	81.8	95.2	94.4	99.2	112.7	113.3	113.2	116.3	124.0	132.8	......

Special Building Cost and Volume Indexes

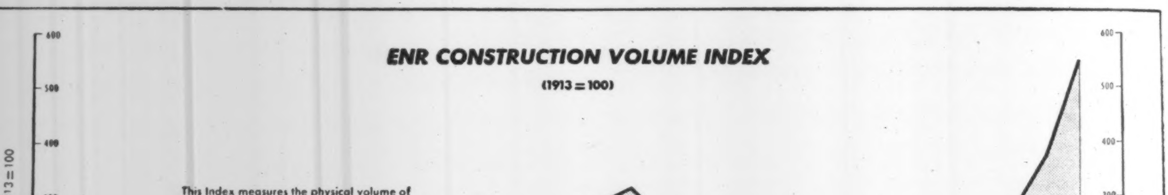
The American Appraisal Company Construction Cost Trend Index — 1913 = 100

For average of four types of buildings: All Frame, Brick-Wood Frame, Brick-Steel Frame and Reinforced Concrete.

These indices cover structural items only, and do not include factors for Plumbing, Heating, Lighting, Elevators, etc.

	1914	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	'31	'32	'33	'34	'35	'36	'37	'38	'39	'40	'41	'42
U. S. AVERAGE	**98**	**101**	**116**	**143**	**177**	**229**	**283**	**216**	**200**	**224**	**222**	**217**	**217**	**217**	**217**	**217**	**200**	**178**	**155**	**150**	**161**	**162**	**170**	**198**	**199**	**200**	**204**	**218**	**241**
							24 Cities														30 Cities								
Boston	100	103	118	149	183	234	288	220	209	232	229	224	224	222	222	224	212	195	169	163	170	169	178	212	209	210	214	225	248
New York	99	100	115	142	175	227	299	245	219	245	241	230	234	234	235	237	219	201	170	167	176	174	182	213	216	219	223	233	248
Buffalo	98	99	115	144	180	232	278	214	197	228	225	218	219	217	213	212	195	178	157	150	160	158	165	202	206	205	207	221	247
Baltimore	97	99	116	150	193	239	289	215	206	233	229	226	224	226	227	228	211	186	166	158	167	173	180	200	200	198	200	220	248
Philadelphia	98	102	115	145	181	236	300	220	201	232	230	224	225	228	227	227	209	190	161	156	166	166	171	193	194	196	207	225	247
Pittsburgh	97	99	115	142	179	231	290	221	201	228	238	233	236	237	236	236	217	198	172	161	170	168	177	211	219	219	219	225	249
Cincinnati	99	100	115	143	173	217	276	211	194	221	221	219	217	219	219	220	202	176	157	151	161	162	174	206	209	209	213	223	242
Cleveland	97	99	120	149	179	233	303	227	210	241	243	236	233	231	232	232	213	188	160	151	164	168	175	208	207	206	209	224	245
Chicago	97	100	116	141	170	224	294	226	202	228	225	224	219	222	222	222	205	185	162	156	166	169	179	204	205	205	207	216	235
Indianapolis	102	104	119	146	175	221	279	221	202	225	227	222	219	222	224	224	206	182	157	150	161	161	169	199	204	205	209	233	247
Detroit	99	102	122	150	187	244	304	220	200	229	227	226	224	222	221	220	202	174	148	146	157	160	168	203	205	207	212	226	252
Milwaukee	100	103	120	150	178	237	290	212	195	224	224	217	218	219	220	218	197	163	144	141	156	163	178	208	208	209	213	225	254
Minneapolis	98	100	114	142	171	218	277	210	193	214	208	201	197	197	197	198	182	165	148	146	154	154	162	199	201	202	203	214	235
Kansas City	98	102	120	150	184	239	280	220	211	231	228	220	220	215	213	213	193	178	156	149	160	162	169	202	209	209	211	221	239
St. Louis	97	100	114	141	175	228	284	225	204	228	238	233	230	226	225	224	205	188	163	156	166	164	171	207	207	207	211	220	238
Atlanta	97	98	111	140	186	250	304	218	202	226	217	209	211	214	215	215	195	173	147	142	162	163	170	192	185	187	193	215	240
Dallas	100	105	121	145	176	227	274	209	191	209	206	198	204	204	202	202	187	168	146	139	149	148	154	170	168	171	173	187	209
New Orleans	97	96	113	136	174	239	282	217	201	225	227	216	217	218	215	215	198	170	145	141	159	159	166	186	187	194	202	214	234
Denver	100	102	118	145	171	216	262	206	191	202	206	204	204	202	205	207	189	168	149	141	150	151	157	190	193	195	199	209	226
Seattle	96	101	115	141	176	224	268	197	186	207	206	201	199	195	194	198	184	159	141	136	150	154	161	194	193	195	200	219	244
San Francisco	97	104	118	139	169	214	258	204	189	208	199	194	188	188	188	190	177	158	144	138	145	144	155	178	176	180	181	201	225
Los Angeles	97	102	112	133	162	213	251	208	199	213	204	197	195	193	193	196	178	157	141	134	142	140	143	165	166	167	166	183	213

NOTE — These construction cost index figures are based on 1913 as 100% for each individual location, thus indicating the trend in each city and not the trend between the various locations. The index figures are calculated on the basis of normal average material prices, average labor wages, and the market conditions in the individual cities and do not reflect extremes such as premium prices and overtime wages for rush work during boom periods or the "extreme low" of cut-throat practices during the "depression periods."



Engineering News-Record Construction Volume Index—1913-100

	1914	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	'31	'32	'33	'34	'35	'36	'37	'38	'39	'40	'41	'42	'43
Jan	71	48	96	69	57	38	138	52	100	151	125	141	198	187	208	325	199	208	121	129	149	131	248	168	172	287	173	402	402	172
Feb	83	76	95	47	151	91	130	55	68	129	144	145	187	182	225	378	204	198	105	82	156	75	177	181	189	187	196	374	507	231
Mar	142	75	90	55	90	52	113	90	186	162	161	161	240	226	318	382	408	278	97	62	130	101	157	146	188	210	162	386	578	228
Apr	113	82	137	65	58	78	134	109	161	186	159	211	233	257	316	332	320	289	135	65	109	130	165	160	176	221	191	322	569	....
May	155	96	129	50	67	80	126	108	221	149	191	209	254	299	299	395	354	251	149	103	101	107	148	214	167	232	201	275	821	....
June	128	105	129	57	106	129	92	119	178	173	149	214	246	297	308	347	324	243	131	109	119	120	193	246	166	193	225	492	752	....
July	139	129	136	87	107	122	83	115	146	151	161	178	248	252	266	320	226	248	166	65	128	95	187	187	207	166	308	635	736	....
Aug	118	126	130	63	111	135	86	116	137	100	162	266	252	306	306	290	259	187	111	73	94	138	197	152	215	228	281	434	622	....
Sept	95	116	145	166	145	113	80	109	149	166	159	262	227	273	296	340	232	225	124	122	101	125	201	150	213	190	324	419	544	....
Oct	108	101	97	87	67	207	79	130	154	154	164	233	244	269	363	273	211	229	137	162	98	159	180	167	217	222	490	263	421	....
Nov	84	150	105	76	66	71	57	106	114	121	128	194	211	272	251	245	207	180	137	133	115	169	163	148	199	219	331	282	462	....
Dec	62	89	106	49	27	41	63	117	134	123	145	206	188	319	244	166	192	133	113	116	105	252	208	143	249	172	344	217	227	....
Aver	107	100	119	67	86	98	99	96	147	146	154	201	228	263	287	317	260	220	127	102	114	134	185	172	197	211	269	375	553	....
1926 = 100	47	44	52	29	38	43	43	42	64	64	68	88	100	115	126	139	114	96	56	45	50	59	81	75	86	92	118	164	243	....

New value reported in *Engineering News-Record* each month.

MOTOR OPERATION

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for WARTIME DOOR EFFICIENCY

Every one of the famous operating advantages of the Kinnear Steel Rolling Door are duplicated in this time-tested Wood Door — a door that is available now, for wartime construction.

SAVES SPACE! The Kinnear Wood Rolling Door rises vertically, coiling into a small area above the lintel. Floor, wall and ceiling space remains usable at all times.

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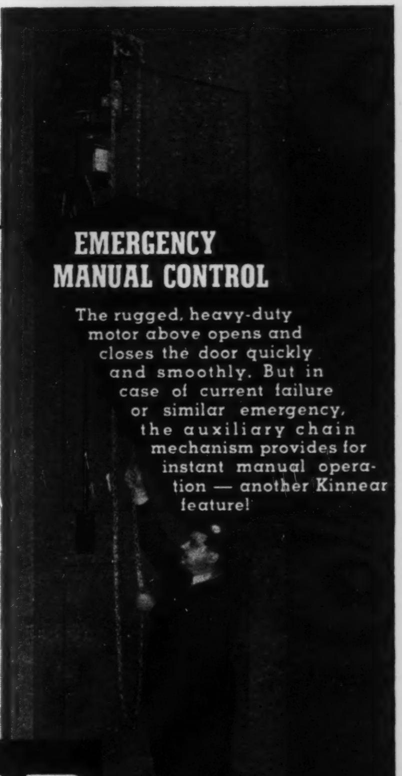

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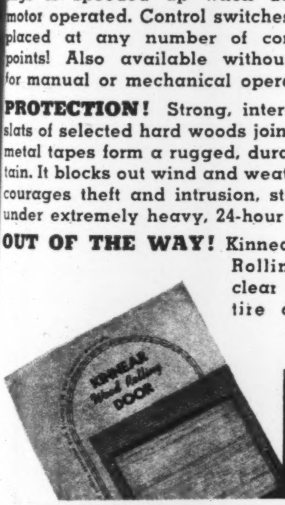
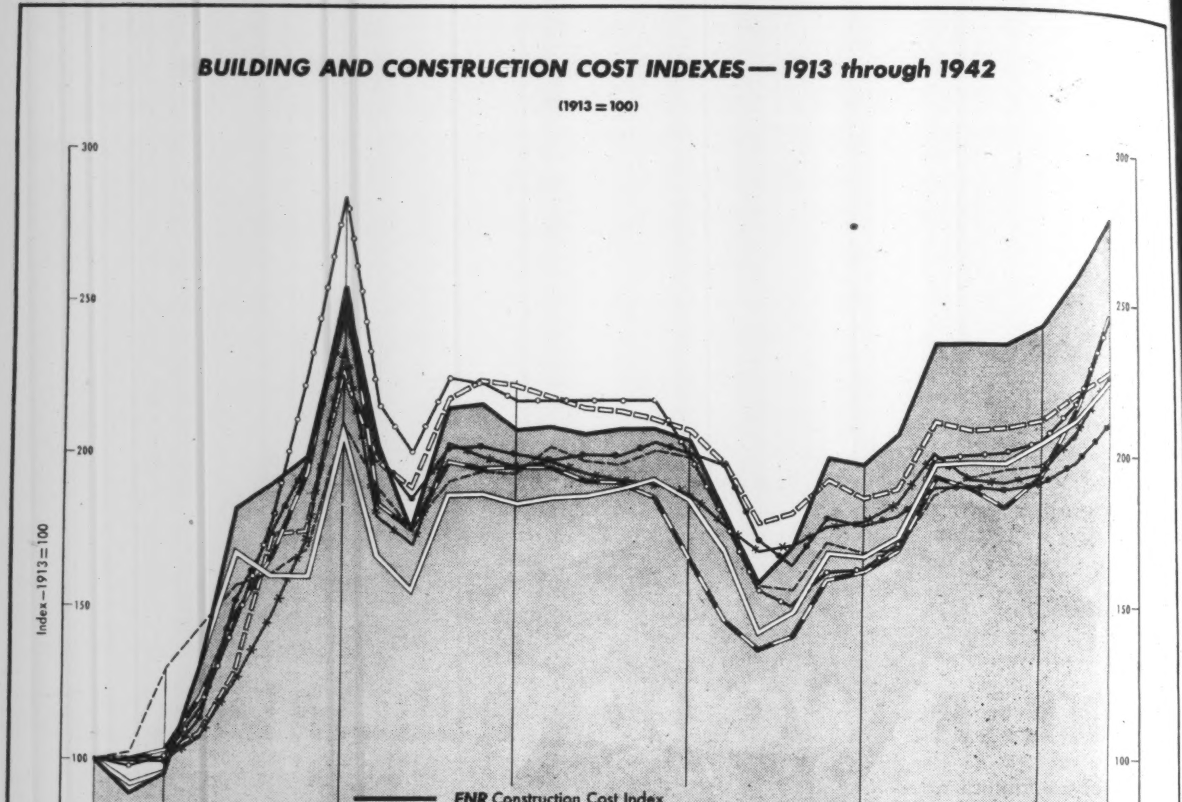
The rugged, heavy-duty motor above opens and closes the door quickly and smoothly. But in case of current failure or similar emergency, the auxiliary chain mechanism provides for instant manual operation — another Kinnear feature!



SAVING WAYS IN DOORWAYS

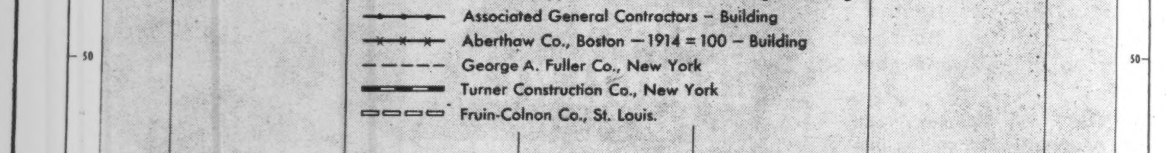
KINNEAR ROLLING DOORS



BUILDING AND CONSTRUCTION COST INDEXES— 1913 through 1942

(1913 = 100)

ENR Business News



THE AUSTIN CO. INDEX OF INDUSTRIAL BUILDING COSTS

(1926=100)

©The Austin Company

Construction and Building Cost Indexes—1913 through 1942

Year Base = 100	AAC (Old) 1913	AAC (New) 1913	AGC 1913	ENR Bldg. 1913	ENR Const. 1913	Boeckh New York 1913	Handy R. C. Atl. Seab'd. 1911-'14	ICC-RR Sta. & Off. Bldg. 1910-'14	Aberthaw 1914	Austin Co. 1913	Fruin-Colnon 1913	Fuller 1913	Tilghman Moyer 1913	Turner 1913
1913	100	100	100	100	100	100	...	...	...	100	100	100	100	100
1914	98	98	99	92	89	102	...	...	100	105	100	102	92	100
1915	101	101	100	95	93	99	...	101	100	115	102	130	96	103
1916	116	116	114	131	130	116	153	115	107	141	108	143	115	120
1917	144	143	152	167	181	135	233	135	126	172	128	156	142	147
1918	172	177	175	159	189	155	242	154	147	206	173	160	148	166
1919	213	229	198	159	198	171	237	185	172	198	174	168	190	196
1920	270	283	247	207	251	230	260	215	234	241	227	209	258	252
1921	205	216	200	166	202	193	207	192	179	180	197	188	210	183
1922	189	200	184	155	174	187	165	180	170	157	188	175	177	175
1923	212	224	201	186	214	215	199	194	202	181	217	190	214	196
1924	210	222	202	186	215	215	226	193	198	181	223	194	212	194
1925	203	217	199	183	207	211	219	188	195	185	222	193	209	195
1926	206	217	197	185	208	230	213	184	197	185	218	202	207	195
1927	206	217	200	186	206	223	208	189	193	178	214	197	202	190
1928	205	217	199	188	207	238	205	188	191	172	213	196	204	190
1929	206	217	203	191	207	242	211	187	190	170	211	201	208	185
1930	199	200	200	185	203	238	200	182	186	155	207	199	196	165
1931	171	178	196	169	181	230	184	165	176	131	196	180	170	145
1932	152	155	171	141	157	208	165	141	168	117	178	157	150	136
1933	146	150	163	148	170	197	159	145	170	117	181	155	152	140
1934	157	161	178	167	198	209	186	151	176	128	191	171	163	160
1935	157	162	176	166	196	200	190	151	177	139	185	167	178	162
1936	163	170	179	172	206	205	192	157	184	150	188	168	188	169
1937	181	198	188	196	235	226	208	166	199	165	210	187	214	192
1938	182	199	189	197	236	243	210	166	191	161	207	192	221	188
1939	183	200	188	197	236	248	206	166	190	152	208	195	229	182
1940	...	204	189	203	242	251	210	177	193	163	211	196	231½	193
1941	...	217	198	211	258	255	228	188	207½	198	220	206	...	215
1942	...	241	209	222	276	260	252	...	223	213	227	...	...	245

Descriptions of Leading Building and Construction Cost Indexes

AMERICAN APPRAISAL COMPANY (AAC)—Average for 30 cities of four types of buildings: wood frame, brick-wood frame, brick-steel frame, reinforced concrete. Mechanicals not included. Based on actual appraisal costs. Available for individual cities (see page 94). Recently revised to include adjustments for social security taxes, unemployment insurance and corresponding "overhead". Base: 1913=100.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA (AGC)—Wages and materials for 12 cities combined in 40-60 ratio. Wages, prevailing rates for hod carriers and common labor. Materials, weighted: sand, gravel and crushed stone, 1; cement, 1; lumber, 1; hollow tile, ½; structural and reinforcing steel, ½. Base: 1913=100.

ENGINEERING NEWS-RECORD BUILDING COST (ENR Bldg.)—For complete description see pages 92 and 93.

ENGINEERING NEWS-RECORD CONSTRUCTION COST (ENR Const.)—For complete description see pages 92 and 93.

E. H. BOECKH & ASSOC., INC.—Individual series for ten types of buildings for sixteen areas. (See page 102.) Weights based on studies of actual building costs—vary with different type of structures. Labor efficiency correction used. Material prices from local building trade papers. Prevailing skilled and common wage rates from contractors. Base: United States average, 1926-29=100. Series given here is brick and concrete, New York, converted to 1913=100 base.

HANDY PUBLIC UTILITY CONSTRUCTION COST—Compiled and published Jan. 1 and July 1 of each year by Whitman, Requardt & Smith. (See page 100.) Individual series for 81 cost elements in three classes of utility construction, for five geographic divisions of United States.

Weighting based on wide experience in cost analysis of plant and construction. Material prices from Engineering News-Record and Iron Age. Labor cost trends from U. S. Dept. of Labor and National Association of Builders Exchanges. Base 1911-14=100. The reinforced concrete building construction series is tabulated in this table.

RAILROAD CONSTRUCTION INDEX (ICC-RR)—Compiled by Engineering Section, Bureau of Valuation, Interstate Commerce Commission. (See page 98). Indexes for road (47 subseries), equipment (8 subseries), and general expenditures (7 subseries), for national average and 8 regional areas. Series quoted here is road, subseries 16, station and office buildings, national average. Computed from analysis of contracts covering major construction projects over 30-year period, and other information furnished by carriers. Base: 1910-14=100.

ABERTHAW—New England, seven-story and basement (62′4″x202′4″), reinforced concrete building built in 1914, repriced quarterly as a construction bid to duplicate original building. Labor costs based on current experience with similar construction. Base: 1914=100.

AUSTIN INDUSTRIAL BUILDING COST—Repricing typical one-story, steel frame, monitor type industrial building at regular intervals. Structure has concrete foundations, curtain walls of brick and large areas of steel sash and glass; concrete floor laid on ground; 2-in. lumber roof deck on heavy timber covered with 4-ply waterproofing. Monitor sash equipped with mechanical operators. Pricing at representative points in central and eastern states. Base: 1926=100. (See page 96.) Table series converted to 1913=100.

FRUIN-COLNON—Industrial plant of five buildings in St. Louis repriced on basis of contractor's actual and estimated material and labor costs. Base: 1913=100.

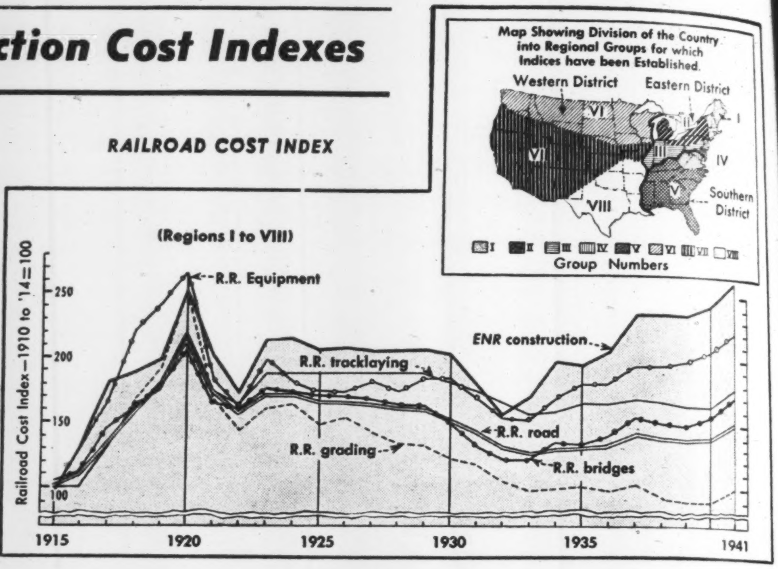
GEORGE A. FULLER COMPANY—Composite of 36 major cost elements, in three commercial type buildings, including mechanicals, elevators, wiring, heating and ventilating, repriced. Base 1913=100.

TILGHMAN MOYER COMPANY—Compiled monthly from actual cost records in construction of bank buildings in eastern United States. Includes all typical building items, and, in addition, all fixtures which are special in bank work, which in many cases exceed structural costs. Index reflects saving occasioned by use of reconditioned equipment from closed banks. Base: 1913=100. Not computed in 1941 or 1942.

TURNER CONSTRUCTION COMPANY—Eastern cities. Own building cost experience applied to these factors: labor rates, material prices, productivity of labor, efficiency of plant and management, competitive conditions. Base: 1913=100.

Railroad Construction Cost Indexes

THESE INDEXES by Engineering Section, Bureau of Valuation, Interstate Commerce Commission, include items developed from analysis of major construction contracts over a period of 30 years. Indexes for material accounts are based on studies of carriers' returns to Valuation Order 14, joint studies made with various sub-committees of Presidents' Conference Committee, well-known engineering and trade publications, contracts covering major construction projects over a period of 30 years, and other information furnished by individual carriers.



Railroad Cost Indexes for Regions by Years for "Road" Construction — 1910-14 = 100

Total of Accounts 1-46, ROAD, Engineering Section, Bureau of Valuation, Interstate Commerce Commission, August 1, 1942

United States	Per Cent	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
Reg. I to VIII	73.09	178	214	175	157	171	171	166	166	164	161	160	152	143	131	127	131	131	133	142	138	137	140	151
Reg. I	75.36	184	220	178	163	177	178	172	173	171	167	166	158	148	134	131	133	134	136	146	141	140	144	156
Reg. II	68.15	180	214	176	160	174	174	168	168	167	165	164	157	145	133	130	134	134	136	146	142	141	145	156
Reg. III	67.99	180	214	176	160	173	173	169	168	167	164	163	155	143	132	129	133	133	136	146	142	144	146	157
Reg. IV	70.49	180	214	173	152	167	166	164	163	159	155	154	145	133	126	122	125	126	127	137	132	131	135	146
Reg. V	76.66	179	218	171	153	168	167	163	164	160	156	156	148	137	129	125	129	128	131	141	137	136	139	149
Reg. VI	77.41	177	215	175	155	169	170	163	164	162	158	158	150	138	129	125	128	128	129	139	134	132	135	145
Reg. VII	75.62	175	212	177	158	170	170	165	166	163	160	158	151	139	131	128	130	129	131	140	135	133	135	145
Reg. VIII	78.15	176	208	173	157	171	171	166	167	164	161	161	154	143	133	130	133	134	135	144	141	140	142	153

(Indexes represent territorial index factors and are not necessarily applicable for determining unit reproduction costs upon individual roads.)

Railroad Cost Index by Accounts Applicable to Entire U. S., Regions I to VIII, Inclusive

"Road" Construction	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
Engineering	178	214	175	157	171	171	166	166	164	161	160	152	143	131	127	131	131	133	142	138	137	140	151
Grading	190	250	170	143	160	164	149	153	143	135	133	123	118	106	98	100	101	99	103	93	90	90	99
Underground Power Tubes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tunnels and Subways	183	208	179	165	179	179	179	178	169	155	155	143	130	119	111	122	120	130	139	141	140	149	160
Bridges, Culverts, etc.	178	206	165	160	176	173	171	170	168	164	163	150	134	122	122	136	135	141	155	150	149	156	174
Elevated Structures	184	210	150	153	173	171	168	165	163	163	162	154	144	129	122	136	136	137	158	150	149	159	175
Ties	170	201	189	157	177	175	172	173	175	176	175	170	155	144	139	149	147	150	159	154	158	164	181
Rails	152	168	158	144	145	145	144	144	144	144	144	144	144	140	134	123	123	124	143	139	136	138	139
Other Track Material	203	209	192	161	182	179	177	177	177	177	170	169	165	163	158	150	147	150	169	169	167	167	170
Ballast	150	207	191	176	175	175	174	175	176	176	176	168	159	146	146	141	139	140	143	143	143	143	153
Track Laying and Surfacing	175	218	174	165	188	188	188	188	188	188	188	182	175	164	157	159	165	165	169	167	165	165	178
Right-of-way Fences	194	204	189	177	179	179	176	175	175	175	173	171	164	147	135	140	140	138	143	144	139	139	147
Snow, Sand Fences, Sheds	199	280	197	194	212	200	201	201	204	204	204	198	188	125	126	140	140	140	155	155	155	155	164
Crossings and Signs	182	208	171	164	178	175	171	169	166	165	165	161	153	131	127	139	137	139	152	145	142	146	163
Station and Office Bldgs	185	215	192	180	194	193	188	184	189	188	187	182	165	141	145	151	151	157	166	166	166	177	188
Roadway Buildings	185	216	192	178	196	196	189	187	192	191	190	186	166	140	145	150	150	150	162	162	162	177	186
Water Stations	191	213	185	178	187	187	186	182	185	186	184	177	161	147	151	155	155	156	166	166	166	172	185
Fuel Stations	190	212	181	166	185	185	182	180	183	183	183	174	159	144	149	154	154	153	159	159	159	163	187
Shops and Engine Houses	188	216	191	180	193	192	188	185	189	188	187	176	161	137	142	147	147	155	165	165	165	176	188
Grain Elevators	185	214	190	184	197	197	193	190	195	193	193	182	165	137	142	147	147	156	164	164	164	166	200
Storage Warehouses	185	210	193	178	198	198	193	189	193	191	191	184	165	137	142	147	147	154	166	166	166	176	195
Wharves and Docks	178	204	167	158	175	175	174	177	178	178	178	172	158	136	141	146	146	149	153	153	153	161	167
Coal and Ore Wharves	184	204	170	159	176	176	174	174	176	176	176	172	157	136	142	147	147	151	153	153	153	160	185
Gas Producing Plants	194	213	194	176	188	189	186	185	188	189	189	178	163	145	148	176	176	178	178	177	179	188	198
Telegraph and Telephone Lines	164	192	191	162	187	179	163	157	163	165	165	150	138	121	119	124	128	131	135	129	129	134	143
Signals and Interlockers	165	175	163	158	165	164	162	169	158	155	154	147	138	130	130	133	136	138	143	143	143	146	156
Power Dams, Canals, Pipe Lines	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	151	149	149	149	150	181
Power Plant Buildings	189	218	197	184	196	196	191	186	191	191	189	177	162	138	143	148	148	152	167	167	167	176	194
Power Substation Buildings	187	218	194	180	197	197	192	188	193	191	190	176	161	137	142	147	147	138	164	164	164	175	187
Power Transmission System	186	176	145	132	142	136	140	141	137	142	150	136	116	98	98	103	105	108	123	110	110	114	119
Power Distribution System	189	205	172	163	178	172	175	176	175	178	181	173	148	144	144	148	151	152	155	149	149	155	163
Power Line Poles, Fixtures	194	230	208	179	209	203	185	183	198	199	209	200	172	147	147	150	153	148	157	152	152	152	173
Underground Conduits	206	250	228	214	220	215	220	216	219	219	217	215	175	175	175	180	184	185	185	185	185	185	190
Miscellaneous Structures	186	217	192	179	195	195	190	186	191	190	189	182	164	141	146	151	151	154	161	161	161	168	178
Paving	205	217	191	190	191	191	191	190	190	190	190	190	181	156	150	145	145	145	150	150	150	150	171
Roadway Machines	158	170	162	149	151	151	151	151	151	149	148	147	144	138	138	147	147	147	161	153	154	158	169
Roadway Small Tools	184	202	181	170	173	185	190	190	191	191	190	160	155	155	150	150	150	160	176	180	180	180	190
Shop Machinery	200	210	198	173	183	185	185	186	187	189	191	176	166	155	155	179	179	179	198	200	202	212	224
Power Plant Machinery	200	210	198	173	183	185	185	186	187	189	191	176	166	155	155	179	179	193	206	199	205	215	223
Power Substation Apparatus	200	210	198	173	183	185	185	186	187	189	191	176	166	155	155	155	150	145	149	151	150	158	160

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every ounce of service you can for the duration. For the e reason you rotate the tires on your car, interchange ch shoes on your excavators to make *them* last longer. oid replacements — save money — conserve materials — prevent delays.

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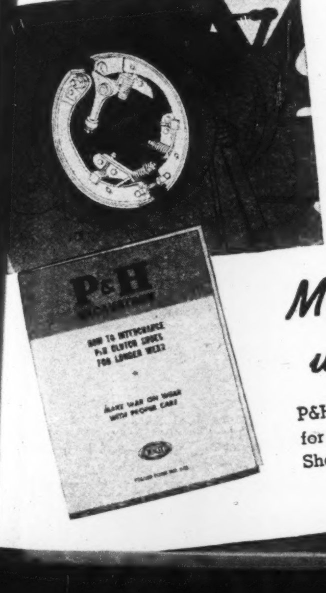
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Public Utility Construction Cost Index

Compiled and published by Whitman, Requardt and Smith, Consulting Engineers, Baltimore, Md., for the Estate of William W. Handy

Table No. 1 Cost Trends of Building Construction, 1911 to 1914 = 100

(Complete Index reports 13 items entering into Building Construction Costs.) A relates to Reinforced Concrete Bldg.; B relates to Brick Bldg.

Cl. of Constr. Mat'l, and Labor	Jan. 1 1919	Jan. 1 1920	July 1 1920	Nov. 1 1920	Jan. 1 1921	Sept. 1 1921	Feb. 1 1922	Jan. 1 1923	Jan. 1 1924	July 1 1924	Jan. 1 1925	July 1 1925	Jan. 1 1926	July 1 1926	Jan. 1 1927	July 1 1927	Jan. 1 1928	July 1 1928	Jan. 1 1929	July 1 1929	Jan. 1 1930	July 1 1930	Jan. 1 1931	July 1 1931	Jan. 1 1932	July 1 1932	Jan. 1 1933	July 1 1933	Jan. 1 1934	July 1 1934	Jan. 1 1935	July 1 1935	Jan. 1 1936	July 1 1936	Jan. 1 1937	July 1 1937	Jan. 1 1938	July 1 1938	Jan. 1 1939	July 1 1939	Jan. 1 1940	July 1 1940	Jan. 1 1941	July 1 1941	Jan. 1 1942	July 1 1942	Jan. 1 1943
Atlantic Seaboard Division																																															
A	237	238	274	269	233	182	165	199	227	224	221	216	213	213	214	203	204	206	209	212	205	194	189	179	171	159	153	165	178	194	191	189	191	192	199	216	214	205	205	207	210	209	220	235	250	253	254
B	220	246	279	278	245	207	188	215	237	232	230	229	228	229	230	223	224	217	219	220	212	207	203	194	189	173	166	175	189	200	195	194	197	197	203	218	217	211	211	214	217	216	224	235	246	250	251
North Central Division																																															
A	220	220	270	263	228	181	163	193	219	214	212	208	203	201	205	194	195	197	200	203	193	190	185	177	169	154	151	162	175	186	182	182	186	187	196	209	209	200	200	200	202	201	210	225	237	242	243
B	199	224	272	269	238	201	181	206	225	218	216	215	212	211	214	208	209	201	203	205	199	195	192	186	181	164	161	170	183	190	185	184	188	189	197	207	208	203	203	203	205	204	210	220	229	234	235
South Central Division																																															
A	224	224	268	263	229	181	160	191	213	206	203	196	192	191	194	186	186	188	191	193	187	179	176	159	149	144	140	148	160	173	179	173	175	177	187	209	198	188	188	187	189	190	199	216	232	236	237
B	203	228	271	270	240	224	181	206	221	211	208	205	203	204	205	201	202	195	197	198	190	185	183	168	160	154	151	157	171	179	182	175	178	180	186	198	197	191	191	191	193	194	200	212	223	227	230
Plateau Division																																															
A	221	220	260	256	221	181	164	192	215	208	208	201	198	197	199	188	189	191	194	196	190	180	177	166	153	149	146	156	168	178	174	172	176	180	188	206	203	194	194	194	197	196	205	218	230	235	235
B	202	226	264	264	232	203	185	207	223	214	214	211	211	210	211	205	205	199	200	201	193	187	184	175	167	163	160	168	182	187	182	181	182	185	191	206	204	199	199	200	201	201	206	214	221	227	229
Pacific Division																																															
A	220	225	266	259	226	187	165	191	212	205	203	196	191	190	196	185	185	188	191	194	188	178	175	165	157	148	145	153	166	177	174	173	175	178	186	200	199	192	192	192	194	192	201	217	238	241	243
B	199	229	268	265	234	207	185	204	217	206	205	201	198	197	203	197	197	190	192	194	186	180	177	169	154	156	154	156	170	177	172	173	176	179	185	198	197	193	193	193	195	194	199	210	226	231	234

Table No. 2 Cost Trends of Gas Plant Construction, 1911 = 100

(Complete Index reports 17 items entering into Gas Plant Construction Costs) A relates to Total Constr. & Equip.; B relates to Mech. Equip. Exclusive of Gas Holders

	1917	1918	Jan. 1 1919	Jan. 1 1920	July 1 1920	Jan. 1 1921	Sept. 1 1921	Jan. 1 1923	Jan. 1 1924	July 1 1924	Jan. 1 1925	July 1 1925	Jan. 1 1926	July 1 1926	Jan. 1 1927	July 1 1927	Jan. 1 1928	July 1 1928	Jan. 1 1929	July 1 1929	Jan. 1 1930	July 1 1930	Jan. 1 1931	July 1 1931	Jan. 1 1932	July 1 1932	Jan. 1 1933	July 1 1933	Jan. 1 1934	July 1 1934	Jan. 1 1935	July 1 1935	Jan. 1 1936	July 1 1936	Jan. 1 1937	July 1 1937	Jan. 1 1938	July 1 1938	Jan. 1 1939	July 1 1939	Jan. 1 1940	July 1 1940	Jan. 1 1941	July 1 1941	Jan. 1 1942	July 1 1942	Jan. 1 1943
Atlantic Seaboard Division																																															
A	186	229	239	253	279	265	205	224	241	238	234	229	230	230	226	223	215	216	216	219	218	216	214	208	202	188	176	178	189	216	216	217	218	218	225	246	246	244	241	249	253	253	257	264	272	275	276
B	195	233	219	222	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299
North Central Division																																															
A	180	203	210	221	257	248	201	206	226	224	220	217	217	218	214	211	204	205	204	206	207	208	207	203	198	178	182	185	196	203	202	203	208	208	219	235	237	235	232	232	236	236	238	245	249	254	258
B	195	233	219	222	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299
South Central Division																																															
A	182	213	214	223	251	246	203	196	214	210	205	199	199	200	198	195	187	187	187	190	188	187	185	177	171	160	158	167	177	184	195	196	202	202	208	223	222	219	216	217	220	220	223	236	244	249	254
B	195	233	219	222	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299
Plateau Division																																															
A	180	207	207	214	234	231	194	193	210	206	206	201	202	202	198	195	187	189	189	191	189	188	186	181	176	166	170	173	184	191	190	190	195	195	202	221	221	220	216	217	220	220	223	228	232	237	238
B	195	233	219	222	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299
Pacific Division																																															
A	180	207	209	228	255	248	212	203	219	215	211	206	205	206	206	203	196	197	197	201	200	198	197	191	187	177	180	178	189	196	195	197	198	203	210	228	228	230	227	228	232	231	235	244	253	257	258
B	195	233	219	222	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299

Table No. 3 Cost Trends of Electric Light and Power Construction, 1911 = 100

(Complete Index reports 50 items entering into Electric Light and Power Construction Costs) A relates to Total Constr. & Equip.; B to Electr. Plant — Steam; C to Sub-Sta. Equip.

Cl. of Constr. Mat'l, and Labor	1918	Jan. 1 1919	Jan. 1 1920	July 1 1920	Jan. 1 1921	Sept. 1 1921	Jan. 1 1923	Jan. 1 1924	July 1 1924	Jan. 1 1925	July 1 1925	Jan. 1 1926	July 1 1926	Jan. 1 1927	July 1 1927	Jan. 1 1928	July 1 1928	Jan. 1 1929	July 1 1929	Jan. 1 1930	July 1 1930	Jan. 1 1931	July 1 1931	Jan. 1 1932	July 1 1932	Jan. 1 1933	July 1 1933	Jan. 1 1934	July 1 1934	Jan. 1 1935	July 1 1935	Jan. 1 1936	July 1 1936	Jan. 1 1937	July 1 1937	Jan. 1 1938	July 1 1938	Jan. 1 1939	July 1 1939	Jan. 1 1940	July 1 1940	Jan. 1 1941	July 1 1941	Jan. 1 1942	July 1 1942	Jan. 1 1943
Atlantic Seaboard Division																																														
A	192	202	208	226	221	183	189	201	196	201	197	197	194	193	187	192	192	195	206	204	188	191	188	182	176	170	177	186	200	200	199	204	205	213	230	226	222	224	225	232	231	233	242	248	248	250
B	160	187	196	206	216	194	186	195	192	199	196	197	196	194	190	193	192	200	208	206	198	198	195	192	186	182	186	200	205	205	204	205	209	210	229	226	223	225	224	235	234	234	236	241	239	242
C	161	178	175	197	201	182	176	187	186	191	190	184	178	176	172	173	173	170	181	179	174	177	175	172	168	165	166	172	184	184	184	185	187	188	204	204	203	203	203	212	212	212	213	217	216	216
North Central Division																																														
A	178	184	189	214	210	176	179	193	189	194	192	190	187	187	182	186	186	189	199	199	184	188	187	186	174	172	179	187	195	195	194	199	199	209	224	222	216	219	218	222	221	222	232	235	238	238
B	145	163	172	188	197	179	171	185	185	189	189	189	188	188	185	188	187	195	202	203	195	197	199	199	186	186	189	203	204	203	202	204	205	209	227	225	222	224	223	225	224	224	229	229	231	231
C	145	155	151	180	184	167	162	178	179	182	184	178	171	171	168	169	169	167	177	176	172	177	179	181	169	169	171	176	184	184	184	184	184	187	204	203	202	203	202	203	203	203	206	207	209	207
South Central Division																																														
A	183	188	193	218	216	183	182	193	186	189	186	184	183	182	179	183	186	189	199	197	185	186	183	179	171	169	179	187	195	198	193	199	201	208	224	221	216	218	218	223	224	227	239	245	246	247
B	152	169	178	197	210	188	181	190	186	189	186	187	189	187	186	189	195	202	210	209	205	204	203	200	190	189	198	211	212	212	203	208	212	214	234	232	229	231	230	235	237	240	246	250	248	248
C	152	160	157	189	195	176	172	182	181	181	181	175	171	170	169	170	176	174	184	182	182	184	183	181	173	173	179	185	192	192	184	188	191	192	211	210	209	210	209	213	216	219	223	226	226	224
Plateau Division																																														
A	183	187	189	211	209	178	179	192	186	191	191	190	188	186	181	185	185	188	198	197	181	183	181	177	171	169	179	188	196	196	195	198	198	206	225	221	216	218	219	223	222	223	232	234	236	236
B	153	171	175	192	202	186	178	191	189	191	194	197	196	194	190	193	193	200	208	207	199	198	197	194	188	188	197	211	212	211	210	210	210	212	234	232	229	231	232	235	234	234	236	237	236	235
C	154	162	154	184	187	173	168	184	183	184	188	185	177	176	172	173	173	171	182	179	175	177	177	175	171	171	177	183	191	191	191	189	189	189	210	209	208	209	211	212	212	212	212	213	212	210
Pacific Division																																														
A	178	182	194	214	214	185	178	187	182	185	182	180	178	181	175	180	179	182	192	191	176	178	175	172	163	161	170	178	189	189	192	196	197	204	221	218	214	216	215	219	218	219	231	235	242	242
B	145	161	179	192	206	191	172	180	178	180	178	178	177	182	178	181	180	187	195	193	186	186	185	182	170	170	178	191	198	197	203	204	204	206	226	223	221	222	222	223	223	223	231	231	240	240
C	146	153	160	184	193	180	163	174	173	174	173	167	161	165	162	163	163	161	171	168	165	167	166	164	155	155	161	166	179	179	184	185	185	186	204	203	202	203	202	203	203	203	[illegible]	210	[illegible]	[illegible]

LEADITE

Trade Mark Registered U.S. Pat. Office

The Pioneer Self-Caulking Jointing Material for Bell and Spigot Water Pipe

Products

LEADITE and the following tools and equipment for use with LEADITE:

BRAIDED JUTE, JOINT RUNNERS, GASOLINE and WOOD BURNING MELTING FURNACES, POURING LADLES, POURING POTS, YARNING IRONS and METAL POURING GATES.

Description

Leadite is principally used for making joints in cast iron bell and spigot water mains; is shipped in powder form in sacks containing 100 pounds.

Users

Water works superintendents, engineers, contractors, mines, railroads and industrial plants all over the world use Leadite. Thousands of miles of pipe jointed with Leadite are in service.

Method of Use

The joint space is first "yarned" and the Leadite is melted and poured into the joint, but requires no caulking. Leadite melts at approximately 250° F. Lead melts at approximately 620° F.

Comparative Quantities

One hundred pounds of Leadite are equivalent to approximately four hundred pounds of pig lead based on the joints being made the same depth with either material. It will be easy to figure the approximate quantity of Leadite required for any given quantity of pipe by referring to our Reference Table, copy of which we shall gladly send to you upon request.

Comparative Cost

Under normal conditions, the economies effected by the use of Leadite save approximately 50% to 75% over the method which requires caulking, owing to the saving effected in material and labor.

Saving

Because Leadite saves on the items of caulking charges, digging of large bell-holes and reduces cost of trench pumping to a minimum, Leadite eliminates most every superfluous operation in jointing cast iron water mains, thus permitting the work to be completed with the least amount of effort.

Tools

As no caulking is required, fewer tools are needed.

No Caulking

Leadite joints require no caulking because Leadite adheres to the pipe from the yarn or jute out to face of bell, making a watertight bond. However, a Leadite joint may be melted or cut out at any time if desired in making connections, etc.

Durability

Leadite has been tested and used for more than 40 years and experience has proven that Leadite joints improve with age.

Expansion and Vibration

Leadite is used with excellent results under railroad tracks, highways and over and under bridges where severe vibration has demonstrated the value of using Leadite on this class of work.

Utility

Leadite is very easy to handle. It is used on all sizes of pipe from four to eighty-four inches in diameter and under all conditions and pressures encountered in water works construction.

Electrolysis

Leadite resists electrolysis.

Damage Suits

Claims for damages caused by joints blowing out are reduced because Leadite joints, if properly made, will not blow out under any pressure common in water works construction.

Transportation

Considerable freight charges are saved because Leadite is light in weight. This also means a saving in cartage and handling on the work because you move approximately one-fourth the weight of jointing material.

Delivery

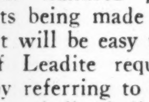
We make prompt shipments of Leadite in any quantities from stock.

Fuel

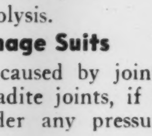
Saves fuel because you melt approximately one pound of material instead of four, and less heat is required to melt Leadite than is needed to melt lead.

Be sure it is Leadite and not something "Just as Good"

THE LEADITE COMPANY
Girard Trust Company Bldg., Philadelphia, Pa.



No Caulking



Boeckh Index of Construction Costs—U. S. Average, 1926–'29 = 100

Annual Averages By Cities	Residences		Apartments, Hotels, Office Bldgs.			Commercial & Factory Bldgs.				
				Brick and					Brick and	
	Frame	Brick	Wood	Conc.	Steel	Frame	Steel	Wood	Steel	Conc.
ATLANTA AREA										
1926–29	82.7	87.0	84.2	83.7	87.0	82.9	94.5	84.7	87.5	86.8
1913	41.2	43.7	42.4	43.3	45.6	40.6	45.2	43.0	44.3	43.0
1918	71.3	74.8	72.7	74.6	80.1	69.7	93.2	72.4	80.7	75.4
1919	103.6	105.1	100.6	87.0	95.0	105.5	95.3	96.1	90.9	86.5
1920	137.1	139.6	133.1	110.6	119.6	140.6	111.8	129.6	108.5	111.0
1921	85.1	88.1	83.9	81.9	84.0	84.5	75.6	82.2	76.8	84.0
1922	83.4	85.8	81.8	79.6	82.2	83.6	73.1	79.5	74.6	80.6
1923	88.6	92.8	89.1	88.9	91.5	88.3	86.7	88.0	86.1	91.9
1924	85.0	89.8	89.2	91.1	91.9	88.8	88.8	88.3	89.8	94.7
1925	81.7	86.5	85.6	88.6	88.6	85.3	89.4	85.1	83.4	92.5
1926	83.1	87.1	83.7	85.1	86.4	82.1	93.4	84.5	86.6	85.1
1927	82.4	85.9	83.6	83.2	84.6	81.8	96.5	84.2	85.5	85.6
1928	85.6	89.4	86.7	86.0	87.9	84.8	93.3	85.7	88.5	86.6
1929	79.7	85.6	82.8	80.5	88.2	82.9	94.8	84.4	89.4	89.9
1930	80.9	85.3	82.8	84.5	85.7	78.2	91.8	83.6	83.6	86.1
1931	78.6	82.8	80.2	80.4	80.4	77.2	82.2	81.6	80.4	82.1
1932	71.0	75.2	73.6	77.2	77.0	68.7	80.8	77.4	78.1	78.3
1933	64.6	69.6	68.3	77.9	76.1	62.7	79.5	71.8	79.0	82.0
1934	70.6	76.6	74.6	83.8	83.4	68.9	91.5	78.5	86.4	87.4
1935	68.4	72.4	73.2	83.9	82.6	64.9	89.7	77.7	85.6	87.6
1936	68.4	72.4	73.2	84.4	83.3	65.8	89.7	77.8	85.8	87.1
1937	79.0	85.1	82.8	92.7	92.2	76.7	97.9	85.7	93.7	95.2
1938	81.6	85.0	85.2	95.9	96.2	79.5	100.5	87.4	96.9	98.1
1939	82.8	86.0	86.1	95.1	95.0	80.6	96.2	88.6	94.6	97.4
1940	88.1	90.3	90.6	96.8	97.3	86.3	100.1	91.5	97.3	98.4
1941	96.2	97.5	97.9	99.6	100.7	95.2	103.0	96.9	100.7	101.2
1942	102.5	102.8	102.8	104.4	105.1	101.1	106.3	101.4	105.1	104.9
BALTIMORE AREA										
1926–29	107.2	112.0	107.6	100.6	100.7	106.3	95.5	106.8	96.8	101.2
1938	91.9	94.8	94.1	98.0	98.0	91.7	100.4	95.6	99.5	98.5
1939	93.5	95.5	95.6	99.3	99.2	94.0	101.7	96.6	101.4	100.2
1940	100.1	101.3	102.0	102.5	103.0	101.0	105.3	102.7	106.1	103.3
1941	109.2	109.9	110.4	107.4	108.1	111.2	108.3	109.7	110.8	108.2
1942	115.1	115.0	115.1	113.6	113.9	115.9	112.2	114.4	116.6	114.2
BOSTON AREA										
1926–29	116.3	120.3	115.4	106.2	107.0	118.8	106.3	112.5	108.7	105.8
1938	104.1	109.4	107.8	114.5	111.9	103.8	113.9	109.1	117.0	116.4
1939	106.2	110.4	110.1	116.3	113.7	105.7	114.2	111.5	118.2	118.5
1940	111.7	114.7	114.3	116.9	114.9	112.3	114.6	114.6	119.1	119.2
1941	121.3	122.4	122.2	118.1	117.6	123.4	115.9	119.3	121.1	120.2
1942	128.4	129.4	129.0	124.3	123.6	131.5	120.1	123.7	126.3	126.3
CHICAGO AREA										
1926–29	109.2	114.2	109.8	113.2	109.1	112.9	105.2	105.9	112.0	116.0
1938	107.9	110.6	109.5	122.7	117.8	111.5	117.9	108.0	122.4	126.7
1939	110.6	112.5	111.1	123.6	118.7	114.2	117.6	109.3	122.6	127.6
1940	117.3	117.8	116.5	124.9	120.9	121.8	118.5	113.4	124.2	128.4
1941	126.9	125.5	124.3	126.9	124.1	132.9	119.9	118.9	126.6	129.6
1942	131.7	130.2	128.9	129.7	127.4	137.7	121.4	122.9	129.2	132.2
CINCINNATI AREA										
1926–29	100.5	105.0	101.3	101.0	100.2	100.2	99.6	103.1	100.6	101.0
1938	100.4	105.1	104.0	112.4	109.2	100.0	111.7	106.0	113.4	114.8
1939	103.3	106.2	105.9	113.9	110.4	103.3	111.7	107.1	113.7	116.5
1940	105.9	108.6	107.8	116.0	112.4	105.9	112.3	108.9	114.5	119.2
1941	112.8	114.0	113.7	116.5	114.5	114.6	112.8	112.6	116.0	118.1
1942	117.1	118.4	118.1	120.6	118.8	118.5	115.5	116.9	119.9	122.1
CLEVELAND AREA										
1926–29	107.2	113.4	108.5	111.3	108.3	109.0	103.0	107.2	110.5	114.8
1938	105.8	109.8	109.4	115.5	112.8	107.0	113.0	109.9	118.1	118.3
1939	106.2	109.6	109.5	115.3	112.8	107.5	112.9	109.5	117.7	118.0
1940	107.8	111.1	110.9	116.1	113.5	109.2	112.3	110.5	117.9	119.2
1941	118.3	120.5	120.1	122.6	120.2	121.7	116.9	118.2	124.1	125.9
1942	123.2	125.3	124.7	127.6	124.8	128.1	119.9	123.1	128.0	130.8
DALLAS AREA										
1926–29	103.1	107.3	103.2	98.9	99.1	103.6	100.5	100.9	99.4	99.7
1938	91.2	92.6	92.7	95.5	96.6	89.7	102.5	93.6	98.1	94.8
1939	95.1	95.8	96.7	98.8	100.2	94.8	106.6	96.0	101.9	98.9
1940	100.7	100.7	101.8	101.1	103.3	100.9	112.8	100.5	106.6	100.6
1941	110.6	109.2	110.2	103.3	106.7	112.2	112.2	106.0	108.9	102.5
1942	117.9	115.9	116.8	110.8	114.5	119.7	118.5	111.3	116.8	109.4
DETROIT AREA										
1926–29	103.3	108.4	104.3	102.9	102.4	103.7	103.1	103.5	103.3	104.4
1938	97.1	101.8	101.8	108.7	107.3	96.9	110.3	102.9	112.5	110.5
1939	98.8	102.7	102.9	108.6	107.5	98.7	108.8	104.2	111.4	110.1
1940	103.3	106.0	106.3	109.2	108.7	103.6	109.7	106.4	111.6	110.6
1941	113.4	114.6	114.7	114.7	114.1	114.8	112.3	113.1	116.6	116.3
1942	119.0	120.6	120.5	121.3	119.9	120.3	116.3	119.4	122.5	123.1
MINNEAPOLIS AREA										
1926–29	92.8	98.2	94.6	95.6	96.1	92.8	100.0	93.9	97.9	98.4
1938	101.2	105.5	103.9	113.4	111.2	102.1	114.7	103.3	115.2	117.2
1939	101.9	105.0	104.2	113.5	110.7	102.7	113.4	103.6	114.5	117.2
1940	106.1	108.2	107.5	113.6	111.7	107.8	113.8	105.4	115.3	117.2
1941	116.6	116.9	116.2	116.4	115.9	120.0	115.8	112.3	118.7	119.9
1942	121.2	121.4	120.6	120.5	120.9	124.5	118.9	116.8	122.7	124.2
NEW ORLEANS AREA										
1926–29	93.3	96.3	93.4	86.5	90.6	93.3	93.7	91.5	89.5	86.5
1938	86.3	87.5	88.5	92.2	95.6	85.0	102.0	88.3	96.0	91.5
1939	89.0	90.3	91.3	95.4	98.3	88.1	102.8	91.7	98.5	94.9
1940	97.3	97.4	98.1	100.3	102.2	97.3	104.7	97.9	101.6	99.2
1941	106.3	105.7	105.9	106.7	108.6	107.9	112.1	104.4	108.7	106.7
1942	110.6	109.9	110.3	110.7	113.0	114.0	118.0	108.0	114.6	111.2
PHILADELPHIA AREA										
1926–29	100.3	106.3	103.7	105.9	103.1	98.1	101.9	104.2	104.1	107.5
1938	93.8	98.5	98.6	104.6	102.2	92.4	103.7	101.7	104.7	106.7
1939	99.2	102.6	102.9	105.7	104.1	98.2	102.0	105.0	105.5	106.7
1940	103.0	105.4	106.0	106.7	106.1	102.1	104.9	107.4	107.9	107.5
1941	113.3	114.0	114.4	111.7	111.6	113.9	109.1	113.6	113.0	111.8
1942	121.8	123.5	123.6	123.1	122.0	122.7	116.6	123.0	123.2	125.1
NEW YORK CITY AREA										
1926–29	133.3	138.4	131.9	122.8	120.4	137.5	113.1	127.4	123.2	125.3
1913	59.5	60.6	57.5	53.9	54.8	61.4	51.4	53.2	53.2	53.7
1918	87.7	89.9	86.4	82.2	87.2	89.2	98.2	83.6	89.2	83.1
1919	100.5	103.5	99.3	92.0	96.9	101.2	97.1	97.2	93.6	91.
1920	136.9	142.0	135.8	123.3	130.0	137.1	120.9	135.0	122.6	123.6
1921	109.8	114.5	109.2	101.3	100.8	110.0	96.1	109.1	100.1	103.5
1922	109.5	114.3	109.0	99.0	98.7	109.8	88.4	109.3	96.3	100.1
1923	124.6	131.3	125.6	112.3	112.2	125.5	105.7	127.0	112.7	115.8
1924	123.5	129.1	123.6	114.4	113.9	125.0	108.5	122.4	115.6	115.7
1925	122.8	126.9	120.4	111.4	110.1	125.7	104.2	117.5	110.3	113.3
1926	131.4	136.9	130.1	120.3	116.7	133.7	118.3	128.1	118.2	123.0
1927	128.4	133.3	126.4	117.2	113.1	131.4	106.5	123.6	115.6	119.9
1928	136.5	140.2	133.5	125.8	122.6	140.5	112.4	126.6	128.2	128.0
1929	140.6	143.2	137.6	127.9	129.2	144.4	115.2	131.3	130.8	130.3
1930	126.7	132.6	125.3	124.1	118.7	131.9	113.8	120.3	123.6	128.0
1931	117.8	124.0	117.8	119.7	113.9	122.7	116.7	113.4	122.8	123.8
1932	100.4	108.1	102.6	105.5	99.8	104.8	102.2	99.8	109.1	112.0
1933	85.0	92.4	88.4	101.1	93.3	85.2	90.1	91.0	97.6	106.2
1934	98.3	104.5	100.2	108.2	103.5	99.8	104.6	100.2	108.8	112.2
1935	92.2	92.5	93.2	103.6	99.6	94.1	102.9	92.9	105.3	107.4
1936	96.4	101.8	97.4	106.8	102.2	98.8	104.9	96.2	107.2	110.5
1937	110.5	115.8	111.2	119.6	116.5	113.1	117.8	109.1	120.6	121.2
1938	118.9	121.4	119.6	128.4	124.0	121.9	123.2	117.0	128.3	130.4
1939	122.1	123.3	122.5	130.6	125.9	125.6	123.7	119.6	130.0	133.3
1940	124.6	125.7	125.1	132.0	127.4	128.0	124.3	122.2	131.2	134.9
1941	134.6	134.1	133.3	135.0	131.3	139.4	126.6	128.7	134.4	137.1
1942	140.7	139.1	138.2	137.9	135.6	145.0	128.5	132.6	137.1	139.3
PITTSBURGH AREA										
1926–29	113.3	118.8	112.8	111.2	107.1	115.4	89.6	112.2	104.6	112.9
1938	112.7	116.4	114.7	117.1	113.7	113.2	114.2	115.6	116.6	118.9
1939	113.8	117.0	115.7	117.5	114.2	114.2	109.8	116.5	116.9	119.1
1940	115.0	117.3	116.7	117.7	114.4	115.6	109.5	117.4	116.2	119.3
1941	125.3	125.7	125.3	120.6	118.7	127.4	111.4	123.8	119.6	122.3
1942	132.7	131.1	130.6	126.0	124.4	133.9	115.4	128.6	124.8	127.6
ST. LOUIS AREA										
1926–29	118.6	121.1	115.7	109.9	108.8	121.3	103.3	111.7	107.7	109.3
1913	62.6	63.7	60.0	56.7	57.3	63.9	53.4	57.8	54.7	57.6
1918	88.4	89.8	86.3	82.5	87.9	90.6	99.2	81.4	89.1	82.7
1919	95.0	97.5	93.6	91.4	96.4	96.7	99.1	90.1	93.8	91.6
1920	121.0	123.3	118.5	112.1	120.0	123.4	116.1	113.7	113.1	110.7
1921	113.3	116.5	110.5	105.0	104.1	115.3	99.4	107.4	103.2	106.7
1922	98.1	102.4	97.9	96.2	95.7	98.7	89.6	96.8	93.9	97.4
1923	116.5	120.9	115.4	110.2	110.2	119.0	104.9	112.6	109.4	111.7
1924	122.1	126.9	120.7	117.3	114.6	125.0	109.1	117.8	115.7	119.2
1925	118.4	123.6	117.9	116.3	113.2	120.9	107.0	115.6	114.4	118.1
1926	120.7	125.4	119.6	115.5	112.8	123.8	106.5	116.5	114.3	116.9
1927	118.1	122.7	116.7	113.5	110.1	121.2	105.4	113.5	112.5	116.0
1928	117.9	119.2	114.2	106.6	97.5	121.1	102.7	110.6	103.6	106.6
1929	117.7	118.1	112.3	104.0	97.2	119.0	98.6	106.2	100.4	103.8
1930	108.3	113.2	108.4	112.4	107.9	110.6	106.2	106.0	111.3	115.3
1931	130.3	108.4	104.0	108.0	102.9	105.6	102.8	102.1	107.8	110.5
1932	95.0	100.7	96.5	99.0	94.6	97.1	97.0	95.0	101.2	102.4
1933	87.3	94.0	90.1	97.9	93.2	88.4	96.8	90.2	99.6	102.8
1934	97.6	105.5	101.7	105.9	102.3	97.2	102.6	103.7	107.6	109.7
1935	91.6	99.7	96.4	104.2	99.3	90.7	101.8	98.9	105.7	108.6
1936	91.0	99.1	95.5	104.9	100.7	90.5	103.3	98.1	106.2	106.3
1937	98.2	106.5	103.2	113.1	111.1	97.8	114.8	106.0	117.0	117.6
1938	104.1	108.5	107.5	118.5	116.4	103.7	117.1	108.5	120.5	122.4
1939	107.0	110.2	109.9	118.7	116.4	107.6	114.3	110.3	119.2	119.8
1940	109.2	111.9	111.6	119.2	117.0	109.9	113.4	111.6	119.2	120.3
1941	117.0	118.7	118.5	121.1	120.2	120.1	116.7	116.3	122.1	121.5
1942	123.3	124.5	124.1	126.9	125.9	126.3	120.9	122.3	126.9	128.6
SAN FRANCISCO AREA										
1926–29	87.7	93.7	90.4	97.5	96.5	86.1	95.5	91.8	95.9	99.0
1913	51.7	56.8	55.0	63.8	61.4	49.7	68.8	57.1	64.4	67.8
1918	76.6	81.0	79.1	85.8	89.1	75.5	109.2	78.7	94.3	87.4
1919	87.8	92.7	90.1	96.7	100.1	87.2	112.1	89.7	102.2	98.5
1920	107.5	112.8	109.8	115.2	121.1	106.9	133.0	109.6	122.1	115.1
1921	89.5	96.8	93.8	102.3	100.2	86.3	106.5	97.2	103.8	105.6
1922	88.3	94.7	91.1	97.1	95.2	86.9	94.9	92.9	95.6	100.5
1923	98.7	104.8	100.8	103.1	103.0	98.8	103.5	100.8	103.1	106.4
1924	86.7	94.2	91.2	99.9	98.0	84.6	99.7	94.3	99.7	103.8
1925	86.5	93.9	91.1	99.5	97.9	84.1	97.0	93.4	98.0	102.1
1926	88.6	96.5	92.2	103.3	100.3	87.3	100.0	95.2	102.6	107.0
1927	87.2	94.8	91.2	102.1	98.3	86.1	97.2	93.1	100.5	103.3
1928	88.1	93.2	90.1	93.1	94.9	86.0	93.5	90.8	90.5	94.4
1929	86.9	90.3	88.1	91.9	92.5	85.0	91.3	88.1	90.0	92.3
1930	86.8	93.8	90.3	100.4	96.8	86.2	100.0	92.0	100.4	104.9
1931	80.6	88.8	85.6	94.6	90.6	79.2	92.5	87.3	94.8	100.7
1932	76.4	84.3	81.6	87.9	84.0	75.4	88.0	84.6	89.8	94.1
1933	68.4	76.7	74.3	84.7	81.0	66.3	82.1	78.5	85.3	89.5
1934	85.0	93.2	90.5	97.5	94.5	82.9	97.2	94.7	99.3	102.4
1935	84.1	91.6	89.0	96.5	94.9	82.1	99.9	92.9	99.8	103.7
1936	86.5	95.6	92.3	103.5	99.8	84.8	102.6	96.2	104.3	109.7
1937	96.7	104.3	101.9	112.2	109.8	95.4	113.0	104.8	113.3	116.0
1938	97.7	105.3	101.8	115.8	112.3	96.1	115.7	105.9	116.0	120.2
1939	99.2	105.7	104.5	117.4	114.4	97.6	114.9	107.4	116.5	121.9
1940	100.7	106.0	106.0	116.4	114.1	99.6	112.2	108.1	115.7	120.4
1941	112.2	115.8	116.2	120.1	119.8	114.3	120.9	115.3	123.4	123.0
1942	120.1	123.6	123.4	127.5	127.5	121.1	127.2	123.7	130.8	129.3
SEATTLE AREA										
1926–29	84.5	92.2	89.2	101.7	95.1	82.4	100.8	92.2	100.5	105.9
1938	96.5	104.3	103.5	119.8	115.7	94.0	120.2	107.6	120.8	125.6
1939	96.7	104.4	103.8	119.2	114.9	94.4	115.1	108.3	118.7	125.3
1940	99.0	106.2	105.5	119.1	115.1	97.2	112.8	109.4	117.7	124.9
1941	109.9	115.1	114.5	123.0	119.9	109.7	118.8	116.1	123.3	128.2
1942	121.5	122.7	122.3	131.7	128.6	116.5	129.2	124.2	133.4	136.7

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See page 92, Apr. 27, 1939, issue for 1914, 1915, 1916 and 1917 data of long series

For definition of this index see p. 97.

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Cost of Financing

COST OF CONSTRUCTION money as measured by high-grade bond yields was steady at low levels in 1942 for U. S. Treasury, state and municipal, railroad, industrial and public utility bonds. Yields of municipals were 12 percent higher than their average rate for a year ago, but were the second lowest ever reported. Treasury bonds climbed 4 percent above their 1942 low. Industrial, public utility, and railroad bond yields were 1.6, 0.7 and 0.3 percent higher than their preceding year's all-time low averages.

The 1942 annual average yields for the various types of high-grade bonds in percent are: municipal, 2.36; industrial, 2.54; public utility, 2.71; and railroad, 3.17. The treasury yield average increased from 1.95 in 1941 to 2.02 percent in 1942.

Opening 1943 yield values declined from their 1942 year-end values. The February, 1943 yield for municipals was 2.22 percent; and the yields for industrials, utilities and railroads were 2.55, 2.65 and 3.12 percent, in that order.

Commercial loan rates, or averages of rates charged by banks in principal cities averaged 2.61 percent for the nineteen reporting cities in 1942, up 3 percent compared with 1941. The New York City average rate, 2.07, compared with 1.97 percent for the preceding year. Seven northern and eastern cities averaged a rate of 2.58 as against 2.55 percent a year ago; and the average for eleven southern and western cities was 3.26 in 1942, and 3.19 percent in 1941.

The 1942 fourth quarter average for the nineteen cities stood at 2.63, an increase of 9 percent over the 2.41 reported at the 1941 year-end.

Bond Yields—Percent

		U. S. Treas. (1)	Municipal (2)	Industrial (3)	Pub. Util. (4)	Railroad (5)
1933		3.31	4.71	4.98	4.69	4.55
1934		3.12	4.03	4.28	4.19	4.01
1935		2.79	3.41	3.73	3.59	3.58
1936		2.65	3.07	3.34	3.38	3.31
1937		2.68	3.10	3.16	3.22	3.45
1938		2.56	2.91	2.82	2.99	3.60
1939		2.36	2.76	2.64	2.83	3.39
1940		2.21	2.50	2.57	2.75	3.26
1941		1.95	2.10	2.50	2.69	3.16
1942		2.02	2.36	2.54	2.71	3.17
1942	Jan.	2.01	2.33	2.53	2.72	3.14
	Feb.	2.09	2.55	2.50	2.75	3.16
	Mar.	2.00	2.58	2.54	2.77	3.16
	Apr.	1.98	2.44	2.51	2.71	3.16
	May	1.97	2.45	2.55	2.70	3.17
	June	1.97	2.38	2.55	2.70	3.19
	July	2.00	2.32	2.52	2.69	3.17
	Aug.	2.02	2.28	2.53	2.69	3.17
	Sept.	2.03	2.25	2.54	2.68	3.17
	Oct.	2.05	2.22	2.53	2.69	3.16
	Nov.	2.06	2.20	2.56	2.67	3.17
	Dec.	2.09	2.26	2.58	2.70	3.16
1943	Jan.	2.06	2.27	2.55	2.68	3.15
	Feb.	2.06	2.22	2.55	2.65	3.12
	Mar.	....	2.21	2.56	2.66	3.13

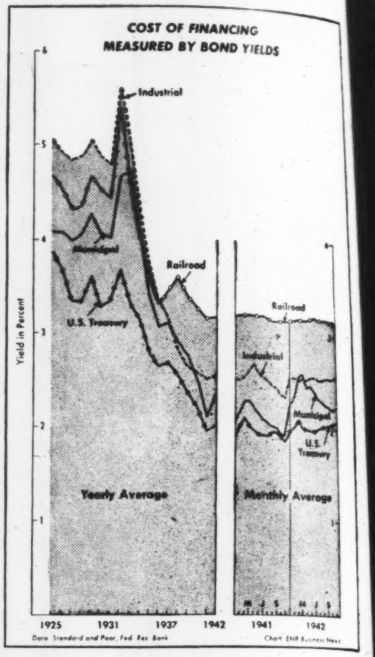
(1) Aver. all U. S. Treasury Bonds except those due or callable within 12 years; 1942 data for partially tax exempt issues.

(2) Standard Statistics & Poors—aver. 15 high-grade long-term municipals.

(3) Standard Statistics & Poors—aver. A1 plus industrials.

(4) Standard Statistics & Poors—aver. A1 plus public utilities.

(5) Standard Statistics & Poors—aver. A1 plus railroads.



Data: Standard and Poor, Fed. Res. Bank

Chart: ENR Business News

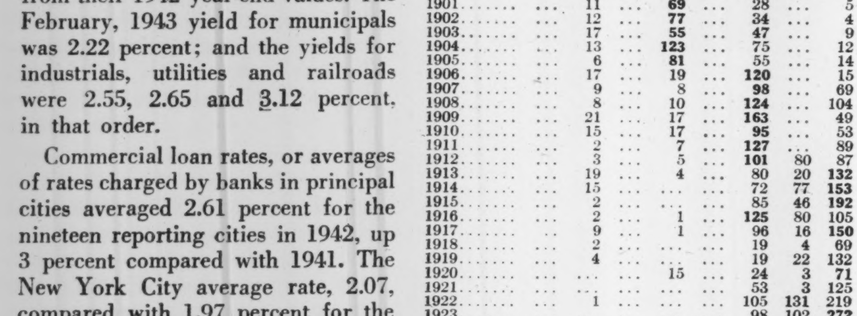
Rate of Interest

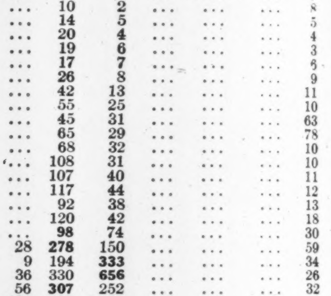
Municipal Bond Sales in the U. S. from Commercial & Financial Chronicle

(Millions of Dollars — 000,000 Omitted)

Year	2%	3%	3¼%	3½%	3¾%	4%	4¼%	4½%	4¾%	5%	5¼%	5½%	5¾%	6% & over	Not Known
1901	...	11	...	**69**	...	28	...	5	...	9	3	...	...	...	7
1902	...	12	...	**77**	...	34	...	4	...	10	**2**	...	...	...	8
1903	...	17	...	**55**	...	**47**	...	9	...	14	**5**	...	...	...	5
1904	...	13	...	**123**	...	75	...	12	...	20	**4**	...	...	...	4
1905	...	6	...	**81**	...	55	...	14	...	19	**6**	...	...	...	3
1906	...	17	...	19	...	**120**	...	15	...	**17**	**7**	...	...	...	6
1907	...	9	...	8	...	**98**	...	69	...	**26**	8	...	...	...	9
1908	...	8	...	10	...	**124**	...	104	...	42	13	...	...	...	11
1909	...	21	...	17	...	**163**	...	49	...	55	25	...	...	...	10
1910	...	15	...	17	...	**95**	...	53	...	45	31	...	...	...	63
1911	...	2	...	7	...	**127**	...	89	...	65	29	...	...	...	78
1912	...	3	...	5	...	**101**	80	87	...	68	32	...	...	...	10
1913	...	19	...	4	...	80	20	**132**	...	108	31	...	...	...	10
1914	...	15	...	...	...	72	77	**153**	...	107	40	...	...	...	11
1915	...	2	...	...	...	85	**46**	**192**	...	117	**44**	...	...	...	12
1916	...	2	...	1	...	**125**	80	105	...	92	38	...	...	...	13
1917	..	9	...	1	...	96	16	**150**	...	120	**42**	...	...	...	18
1918	...	2	...	...	...	19	**4**	69	...	**98**	**74**	...	...	...	30
1919	...	4	...	...	...	19	22	132	28	**278**	150	...	...	...	59
1920	...	...	...	15	...	24	**3**	**71**	9	194	**333**	...	...	...	34
1921	...	...	...	...	...	53	**3**	125	36	330	**656**	...	...	...	26
1922	...	1	...	...	...	105	**131**	219	56	**307**	252	...	...	...	32
1923	...	...	...	...	...	98	102	**272**	138	237	203	...	...	...	13
1924	...	...	4	...	...	150	**339**	294	109	281	203	...	...	...	22
1925	...	...	1	...	...	270	302	**314**	76	202	201	...	...	...	30
1926	...	...	...	...	...	212	287	**342**	76	215	199	...	...	...	35
1927	...	16	10	...	...	**361**	321	336	79	180	160	...	...	...	46
1928	...	...	37	...	...	365	**384**	281	68	150	111	...	...	...	19
1929	...	3	65	...	...	107	133	**449**	132	250	281	...	...	...	10
1930	...	2	60	...	...	338	326	**341**	150	155	97	...	...	...	18
1931	...	92	...	181	...	241	**311**	**197**	51	99	**77**	...	...	...	6
1932	...	31	...	19	...	68	56	151	73	122	**322**	...	...	...	7
1933	...	32	15	29	39	**131**	48	51	22	61	3	20	3	52	15
1934	**84**	107	94	54	72	**197**	54	75	41	88	**13**	23	4	13	20
1935	**161**	**349**	62	137	71	234	40	50	22	26	**3**	3	2	9	50
1936	**211**	**343**	71	156	35	212	14	23	**3**	**16**	**1**	1	...	2	28
1937	**73**	**422**	55	95	50	134	26	13	**3**	**7**	**1**	1	...	1	21
1938	**360**	256	105	102	54	149	21	**11**	**8**	**8**	**3**	...	1	1	20
1939	**446**	282	80	58	30	128	71	8	2	**4**	...	1	...	1	15
1940	**437**	**446**	84	80	55	90	16	8	1	**2**	...	...	...	1	14
1941	**450**	214	120	48	27	53	6	3	**2**	**2**	...	...	...	...	29

Bold face type indicates interest rates on which bulk of financing was done for year.





Data: Federal Reserve Board

Chart: ENR Business News

REEDOM IS NOT FREE~IT IS PRICELESS ~ *BUY WAR BONDS*

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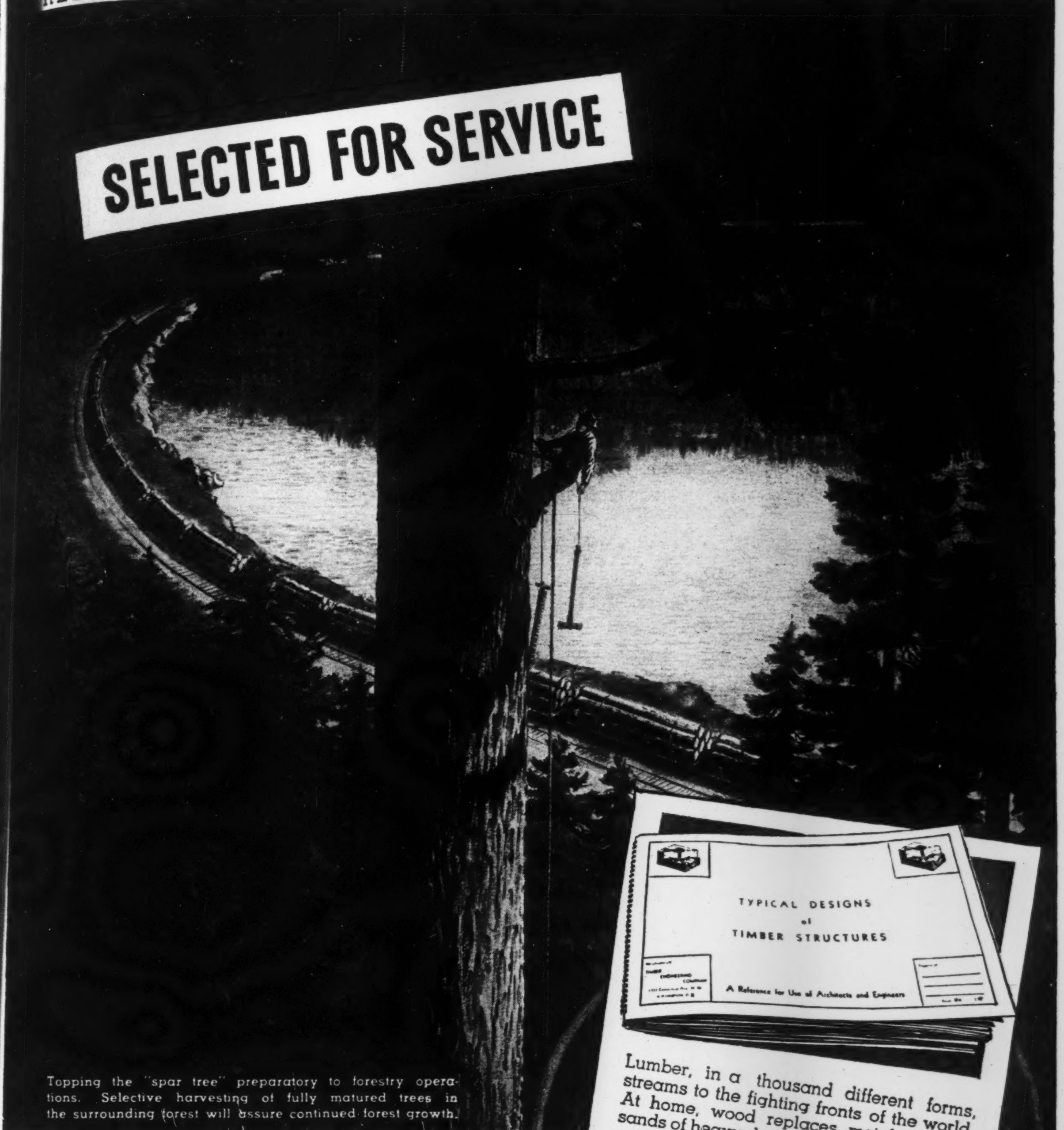
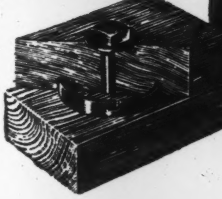


Topping the "spar tree" preparatory to forestry operations. Selective harvesting of fully matured trees in the surrounding forest will assure continued forest growth.

Lumber, in a thousand different forms, streams to the fighting fronts of the world. At home, wood replaces metal in thousands of heavy duty war structures—made possible by the TECO Connector System of Timber Engineering. This FREE Reference Book shows details of 45 typical timber designs for roof trusses, bridges, towers, tanks, hangars, and other structures for the war today and the peace tomorrow. Available to practicing engineers and architects. Write for it today—using your firm letterhead.



The *TECO* Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

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WOOD GOES TO WAR — An MGM Technicolor short by James A. Fitzpatrick. Ask your theater when you can see it.

Base Rates on Compensation Insurance for Construction—April 1, 1943

Data compiled by Herbert L. Jamison & Co., Insurance Brokers, New York, N. Y.

Classification of Work (A)	Ala.	Ariz.	Ark.	Cal. (O)	Colo.	Conn.	Del.	D. C.	Fla.	Ga.(O)	Idaho	Ill.
1. Carpentry — private residences	1.83	4.22	5.43	5.56	3.44	2.33	2.35	3.76	3.36	2.01	3.38	3.35
2. Carpentry — dwellings, 3 stories or less	1.83	10.55	5.43	5.56	3.44	2.33	2.35	3.76	3.36	2.01	3.38	3.35
3. Carpentry — interior trim	.93	4.22	2.93	5.56	1.74	1.69	2.35	2.19	1.13	1.40	1.64	1.47
4. Carpentry — general	2.99	10.55	8.65	5.56	4.18	5.58	2.35	5.02	3.36	5.11	5.55	5.37
5. Concrete and cement walk laying	1.13	2.68	3.12	2.02	2.18	2.11	2.25	2.51	1.41	1.52	2.06	1.93
6. Concrete work — general (B)	3.14	10.00	9.77	5.20	4.54	6.01	3.00	5.10	3.99	3.62	5.50	4.57
7. Concrete work — dwellings, 3 stories or less (B)	1.49	10.00	4.10	5.20	2.95	3.31	3.00	4.59	2.05	1.57	2.68	2.63
8. Electric wiring	1.10	3.33	2.62	2.57	1.89	1.76	1.25	2.61	1.57	1.77	1.86	1.46
9. Excavation — earth (C)	1.97	8.02	4.58	4.63	6.14	4.75	2.20	4.51	2.10	2.16	5.74	3.09
10. Excavation — rock (D)	3.24	13.33	8.30	8.30	6.13	6.11	2.20	8.11	3.97	3.77	6.15	5.06
11. Glazing	2.61	6.50	7.13	5.93	4.90	4.61	1.05	6.06	3.48	3.39	4.95	3.87
12. Lathing	1.23	4.78	3.93	5.15	2.34	2.24	1.15	2.91	1.50	1.85	(L)	1.98
13. Masonry	1.49	6.57	4.10	3.12	2.95	3.31	1.60	3.85	2.05	1.57	2.68	2.63
14. Painting (J)	1.86	6.22	5.00	5.03	3.59	2.93	1.90	4.14	2.18	2.88	3.84	2.58
15. Plastering	1.51	4.20	3.74	5.15	2.84	2.57	1.15	3.09	2.40	1.90	2.76	2.33
16. Plumbing	1.12	2.82	2.75	2.09	2.06	1.87	.90	2.54	1.64	1.32	1.99	1.76
17. Roofing	4.94	11.50	9.73	10.41	9.14	8.56	1.75	10.81	5.46	6.14	9.51	8.27
18. Sheet metal erection	1.54	5.33	4.66	10.03	2.89	2.89	1.75	3.49	2.01	2.20	2.83	2.29
19. Steel erection — general (C)	7.72	23.33	18.03	10.23	13.20	12.69	6.50	17.07	9.22	7.91	13.56	10.92
20. Steel erection — structural (C)	9.47	25.46	22.34	17.66	20.17	15.93	6.50	21.97	12.66	10.50	19.12	11.83
21. Steel erection — interior ornamental	1.78	4.58	5.51	4.07	3.38	3.21	6.50	4.13	2.22	2.53	(L)	2.98
22. Steel erection — dwellings, 3 stories or less	4.61	9.47	13.34	17.66	8.04	8.21	6.50	9.74	6.29	6.51	8.82	7.54
23. Tile laying	.81	2.89	2.51	1.61	1.51	1.49	.65	2.25	1.13	1.17	1.41	1.27
24. Watchmen and timekeepers (I)	1.80	4.78	3.81	(G)	3.42	3.29	(G)	4.27	2.27	1.83	3.26	2.92
25. Waterproofing	2.31	5.82	5.91	4.43	4.33	4.08	(N)	5.33	2.85	2.76	(L)	3.55
26. Wrecking	10.44	33.45	27.47	26.14	19.78	17.84	15.60	24.35	14.51	13.13	(L)	24.26

Classification of Work (A)	Ind.	Iowa	Kans.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	**Miss. (E)**	Mo.	Mont.	Neb.
1. Carpentry — private residences	3.13	3.10	2.81	3.07	4.99	1.99	2.76	2.63	5.22	4.83	**2.86**	4.60	3.85	3.82
2. Carpentry — dwellings, 3 stories or less	3.13	3.10	2.81	3.07	4.99	1.99	2.76	2.63	5.22	4.83	**2.86**	4.60	3.85	3.82
3. Carpentry — interior trim	1.15	1.26	1.62	1.29	2.14	1.37	1.56	1.67	1.77	4.83	**1.99**	4.60	1.86	1.96
4. Carpentry — general	4.28	3.40	5.95	4.33	6.33	5.19	5.67	7.60	5.22	4.83	**11.50**	4.60	6.33	6.47
5. Concrete and cement walk laying	1.36	1.55	2.00	1.60	2.62	1.72	1.96	2.17	1.82	1.91	**2.61**	2.80	2.33	2.43
6. Concrete work — general (B)	3.32	3.76	5.85	4.60	7.60	4.30	4.91	5.48	6.30	5.78	**9.71**	7.05	5.73	7.34
7. Concrete work — dwellings, 3 stories or less (B)	1.86	1.70	2.65	1.68	3.31	3.30	3.53	5.10	2.54	1.65	**6.83**	4.23	3.02	2.99
8. Electric wiring	1.35	1.36	1.73	1.43	2.33	1.48	1.71	1.43	1.50	2.26	**2.40**	2.30	2.09	2.15
9. Excavation — earth (C)	1.94	2.78	4.11	2.38	3.42	3.61	4.56	4.53	3.57	4.17	**5.34**	6.37	6.55	4.63
10. Excavation — rock (D)	4.03	4.22	5.77	4.70	(L)	4.64	5.44	8.53	6.42	5.91	**9.93**	7.37	7.02	(L)
11. Glazing	3.24	3.42	4.61	3.77	5.79	3.76	4.36	3.94	4.44	4.75	**3.71**	5.50	5.61	5.56
12. Lathing	1.54	1.66	2.17	1.76	2.81	1.82	2.09	2.56	2.27	2.30	**2.46**	3.36	2.59	2.65
13. Masonry	1.86	1.70	2.65	1.68	3.31	3.30	3.53	5.10	2.54	1.65	**6.83**	4.23	3.02	2.99
14. Painting (J)	2.76	2.40	3.32	3.32	3.69	2.74	3.33	(K)11.48	2.98	3.44	**3.21**	3.63	4.39	4.25
15. Plastering	1.82	2.01	2.65	2.09	3.13	2.21	2.45	3.10	2.62	2.98	**2.46**	3.97	3.13	3.19
16. Plumbing	1.64	1.59	1.75	1.64	3.21	1.67	2.01	1.72	1.92	2.34	**2.94**	2.12	2.28	2.35
17. Roofing	7.03	7.61	8.92	6.09	8.48	7.26	8.82	10.40	13.98	10.24	**8.42**	5.58	10.81	10.57
18. Sheet metal erection	1.99	2.09	2.67	2.23	3.88	2.27	2.51	1.71	2.29	2.96	**6.25**	2.88	3.20	3.26
19. Steel erection — general (C)	7.02	10.69	12.03	10.79	12.90	9.76	12.03	16.88	11.86	13.06	**19.06**	16.59	15.26	14.91
20. Steel erection — structural (C)	11.57	11.72	15.96	14.99	15.57	12.05	15.11	20.34	24.09	17.89	**32.39**	28.27	21.99	20.92
21. Steel erection — interior ornamental	2.22	2.35	3.14	2.53	4.09	2.60	3.00	3.18	3.28	3.34	**7.35**	4.08	3.72	3.79
22. Steel erection — dwellings, 3 stories or less	5.65	(L)	8.59	6.76	10.13	6.98	8.15	20.34	8.35	8.06	**14.77**	11.59	10.10	9.92
23. Tile laying	1.00	1.10	1.40	1.10	1.87	1.22	1.35	1.60	1.58	1.52	**1.39**	1.89	1.59	1.69
24. Watchmen and timekeepers (I)	2.25	2.43	3.17	2.53	4.16	2.69	2.98	3.52	3.28	3.39	**5.41**	4.12	3.69	3.87
25. Waterproofing	2.86	2.99	4.08	3.34	5.04	3.31	3.87	4.81	4.16	4.16	**3.33**	5.10	5.03	4.94
26. Wrecking	14.52	13.71	14.84	15.27	21.96	15.11	17.35	17.97	32.67	7.55	**23.44**	33.0[illegible]	22.43	22.35

Classification of Work (A)	Nev.(F)	N. H.	N. J.	N. M.	N. Y.	N. C.	N.D.(F)	Ohio(F)	Okla.	Ore(H)	Pa.	R. I.	S. C.
1. Carpentry — private residences	State Insurance Plan Nevada Industrial Commission, Carson City, Nev.	1.85	6.00	2.63	7.63	2.62	North Dakota State Plan: Workmen's Compensation Bureau, Bismarck, N. D.	Ohio State Plan: Workmen's Compensation, The Industrial Commission of Ohio, Actuarial Section, Columbus, Ohio	5.76	6.36	2.40	5.87	4.65
2. Carpentry — dwellings, 3 stories or less		1.85	6.00	2.63	7.63	2.62			5.76	6.36	2.40	5.87	4.65
3. Carpentry — interior trim		1.17	(L)	1.39	7.63	1.44			3.55	2.94	2.40	3.12	1.62
4. Carpentry — general		4.14	8.10	4.68	7.63	4.17			11.23	7.49	2.40	11.89	7.91
5. Concrete and cement walk laying		1.46	4.50	1.72	4.44	1.62			4.35	3.19	3.45	3.85	2.35
6. Concrete work — general (B)		3.33	10.80	3.95	9.81	4.95			12.62	6.69	5.85	10.37	8.71
7. Concrete work — dwellings, 3 stories or less (B)		2.81	9.10	2.14	9.81	2.16			4.19	5.83	5.85	7.33	3.92
8. Electric wiring		1.25	2.55	1.47	3.28	1.62			4.08	3.29	1.55	3.21	2.14
9. Excavation — earth (C)		3.51	9.00	4.84	9.96	2.69			7.57	7.46	3.45	9.85	5.34
10. Excavation — rock (D)		3.99	11.80	4.79	10.70	5.73			12.32	(L)	3.45	11.64	9.70
11. Glazing		3.20	7.80	3.87	11.08	4.10			9.83	6.73	1.65	9.30	5.37
12. Lathing		1.57	5.50	1.83	3.31	1.94			4.71	5.72	1.65	4.31	3.32
13. Masonry		2.81	8.70	2.14	8.26	2.16			4.19	5.83	2.60	7.33	3.92
14. Painting (J)		2.41	8.40	2.91	8.98	2.36			6.29	6.67	3.25	6.44	3.59
15. Plastering		1.91	5.70	2.22	5.65	2.07			5.61	5.72	1.65	5.28	3.32
16. Plumbing		1.51	3.70	1.90	4.17	1.59			3.71	2.91	1.55	3.66	2.31
17. Roofing		6.20	13.70	7.19	23.12	5.89			19.07	15.59	3.10	18.37	9.15
18. Sheet metal erection		1.93	4.70	2.28	6.85	2.44			5.71	6.42	3.10	5.23	3.59
19. Steel erection — general (C)		8.46	19.00	9.61	27.31	11.14			31.13	(L)	10.00	25.78	14.62
20. Steel erection — structural (C)		11.84	26.50	15.24	40.36	15.63			37.35	25.39	10.00	36.51	19.63
21. Steel erection — interior ornamental		2.27	(L)	2.65	5.47	2.79			6.91	5.94	10.00	6.27	3.46
22. Steel erection — dwellings, 3 stories or less		5.90	13.50	6.96	16.02	7.08			17.61	12.19	10.00	17.52	11.27
23. Tile laying		1.03	2.35	1.21	3.11	1.23			3.08	2.10	1.00	2.67	1.53
24. Watchmen and timekeepers (I)		2.32	(L)	2.68	8.98	2.80			6.91	5.45	(G)	6.17	2.85
25. Waterproofing		2.81	7.70	3.42	(N)	3.67			8.62	4.70	(N)	8.27	3.80
26. Wrecking		12.99	33.10	15.51	(M)	16.44			39.76	32.43	24.00	37.22	32.77

Classification of Work (A)	S. D.	Tenn.	Tex.	Utah	Vt.	Va.(O)	Wash.	W. Va.	Wis.	Wyo.(F)
1. Carpentry — private residences	2.66	2.72	3.09	4.41	1.82	2.15	4.59	West Virginia State Plan: State Compensation Commission, Charleston, W. Va.	5.48	Wyoming State Plan: Manager, Workmen's Compensation Dept., State Treasurer's Office, Cheyenne, Wyo.
2. Carpentry — dwellings, 3 stories or less	2.66	2.72	6.35	4.41	1.82	2.15	4.59		5.48	
3. Carpentry — interior trim	1.21	1.68	2.24	4.41	.86	1.13	1.50		5.48	
4. Carpentry — general	3.30	4.81	6.35	4.41	2.66	3.56	6.08		5.48	
5. Concrete and cement walk laying	1.47	1.86	(L)	2.90	1.07	1.34	2.30		2.57	
6. Concrete work — general (B)	3.69	3.86	6.35	10.00	2.68	3.57	5.15		6.75	
7. Concrete work — dwellings, 3 stories or less (B)	1.51	2.16	6.35	10.00	2.21	1.89	4.48		3.54	
8. Electric wiring	1.26	1.61	2.14	2.44	.92	1.22	2.53		2.41	
9. Excavation — earth (C)	2.56	2.60	4.76	7.18	2.68	2.03	5.39		5.16	
10. Excavation — rock (D)	(L)	4.55	7.20	8.06	2.94	3.87	10.49		8.49	
11. Glazing	3.02	4.03	5.43	3.50	2.37	3.15	5.17		7.65	
12. Lathing	1.52	2.20	2.97	3.50	1.12	1.52	4.04		3.73	
13. Masonry	1.51	2.16	6.35	4.41	2.21	1.89	4.48		3.52	
14. Painting (J)	2.53	2.23	2.82	4.00	1.88	2.12	5.13		3.49	
15. Plastering	1.88	2.43	3.44	5.50	1.38	1.87	4.04		2.43	
16. Plumbing	1.43	1.54	2.03	1.96	1.08	1.69	2.24		2.67	
17. Roofing	5.77	6.07	8.84	12.56	4.57	6.28	(L)		13.88	
18. Sheet metal erection	1.90	2.60	2.57	4.00	1.42	1.92	4.59		3.59	
19. Steel erection — general (C)	7.32	11.05	11.30	20.00	6.27	7.70	12.98		16.47	
20. Steel erection — structural (C)	10.33	13.19	21.64	20.00	8.76	10.96	19.52		16.47	
21. Steel erection — interior ornamental	2.19	3.04	4.12	4.48	1.64	2.15	4.57		4.42	
22. Steel erection — dwellings, 3 stories or less	5.05	7.93	21.64	9.94	4.15	5.44	9.53		10.79	
23. Tile laying	1.07	1.44	1.79	3.80	.75	1.01	1.62		1.93	
24. Watchmen and timekeepers (I)	2.32	2.16	(G)	4.56	1.66	2.24	4.69		5.04	
25. Waterproofing	2.58	3.33	5.03	5.70	2.09	2.78	(L)		6.11	
26. Wrecking	12.28	16.69	22.76	43.00	9.49	12.8[illegible]	24.93		30.00	

Note: **Base rates — in effect April 1, 1943 — subject to increase or decrease according to experience ratings.** (A) Special rates apply for carpentry, concrete and steel work on military reservations. (B) Includes construction of forms. (C) Includes blasting but not pile driving, caisson or cofferdam work. (D) Includes blasting but not pile driving, caisson or cofferdam work — special rate for occupational disease coverage. (E) Employers liability rates — no compensation law in this state. (F) Compensation must be carried in Monopolistic State Fund. (G) Assign operation to principal classification. (H) Operations specified as hazardous by law must be insured in State Fund. (I) Not available if general contractor is conducting operations at job. (J) Painting bridges and steel structures classified as steel erection. (K) Painting indoors — rate of 1.43 in Mass. (L) Rate available on application to company only. (M) Rated on cubic content basis. (N) Waterproofing rated according to type in Del., N. Y., Pa. (O) Rate revisions pending in Calif., Ga. and Va.

Prices of Construction Materials

CONSTRUCTION MATERIAL price averages were generally higher in 1942. Exceptions, however, were cast iron pipe and structural steel shapes, unchanged from a year ago. In New York, portland cement averaged $2.20 per barrel, not including sack cost, and was up 2.3 percent compared with the 1941 average price. Longleaf yellow pine (12x12-in.) was 18 percent higher than a year ago.

Common brick in New York began 1942 at $13.00 per M, increased to $13.50 in March, to $14.50 in June, and to $15.00 in September, a price that held for the rest of the year.

Basic Building Materials Prices

1874 to 1942 in New York City

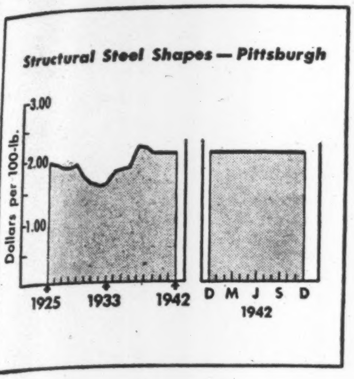
Average yearly prices at New York, except in the case of steel, which is f. o. b. Pittsburgh mill; wrought, iron I beams for years 1879, 1885 and 1886. Brick, wholesale, f. o. b. Lime, common lump, wholesale, f. o. b., 180 lb., net, 1910–15, incl.; afterward, 280 lb. Cement, net, delivered; *Rosendale, 1874 to 1878, incl.;* afterward, Portland. Lumber, No. 1 com., rough, wholesale, at dock, for 1 in., yel. pine, 1874 to 1909, incl.; afterward, 3 in., long-leaf to 1913, incl. *LLYP–3 x 12 — from Lumber Trade Journal. †LLYP–12 x 12 as reported to Engineering News-Record. Cast iron pipe price per ton f. o. b. Delaware River foundries; *prices prior to 1901 are for all classes of bell and spigot;* prices subsequent to 1901 are for 6 in. and larger Cl. B or heavier bell and spigot; early prices from "Price History of Cast Iron Pipe" by United States Cast Iron Pipe and Foundry Co.; prices 1850, $35.72; 1855, $40.18; 1860, $32.15; 1865, $58.05; 1870, $50.

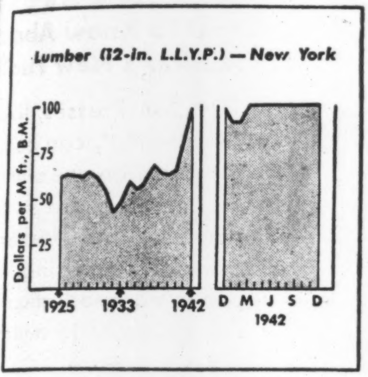
	Brick Common per M	Cement Per Bbl.	Lime Per Bbl.	Pine per M. Ft. b.m.		Steel Shapes, Per 100 Lb.	Cast Iron Pipe, Per Ton
1874	$7.41	*$1.48*	$1.50	$26.00		....	*$43.76*
1875	7.12	*1.25*	1.40	21.00		....	*37.51*
1876	5.87	*1.20*	1.00	21.00		....	*31.26*
1877	4.93	*1.10*	.80	20.00		....	*25.00*
1878	4.71	*.95*	.70	20.00		....	*23.22*
1879	4.08	2.70	.80	20.96		$2.78	*29.47*
1880	7.00	2.88	.87	19.00		....	*29.47*
1881	7.50	2.72	.95	19.00		....	*33.04*
1882	7.12	2.82	1.01	19.00		....	*35.68*
1883	8.28	2.75	1.05	19.00		....	*32.15*
1884	6.65	2.60	.95	19.00		....	*26.79*
1885	6.10	2.28	1.00	18.66		3.12	*25.00*
1886	7.51	2.28	1.00	19.00		3.00	*26.79*
1887	7.43	2.07	.82	19.00		....	*28.58*
1888	6.50	2.16	.83	16.75		....	*25.00*
1889	7.06	2.23	.92	20.31		....	*23.04*
1890	6.65	2.25	.95	21.75		....	*24.65*
1891	5.53	2.38	.87	18.00		....	*23.04*
1892	5.77	2.27	.93	18.50		....	*21.43*
1893	5.83	2.15	.93	18.50		....	*21.30*
1894	5.00	2.03	.85	18.50		1.20	*18.47*
1895	5.31	1.97	.78	16.92		1.35	*17.95*
1896	5.06	2.00	.69	16.42		1.60	*17.64*
1897	4.94	1.97	.72	16.44		1.24	*15.48*
1898	5.75	2.00	.70	15.75		1.27½	*15.48*
1899	5.69	2.05	.75	16.25		1.45	*21.17*
1900	5.25	2.16	.68	24.50		1.95	*22.33*
1901	5.77	1.89	.77	17.50		1.60	*21.63*
1902	5.39	1.95	.81	21.00		1.60	26.62
1903	5.91	2.03	.79	23.50		1.70	27.56
1904	7.50	1.67½	.80	21.50		1.60	22.92
1905	8.10	1.43	.89	24.92		1.62	26.54
1906	8.55	1.55	.95	29.33		1.60	30.12
1907	6.16	1.55	.95	30.50		1.75	31.52
1908	5.10	1.46	1.05	30.50		1.76	24.69
1909	6.39	1.41	1.05	33.04		1.50	24.19
1910	5.70	1.07	.75	24.00		1.46	22.99
1911	5.31	1.04	.75	24.63		1.36	19.99
1912	6.75	.97	.75	24.92		1.33	21.22
1913	6.75	1.18	.91½	* 25.04 †		1.50	21.96
1914	5.50	1.17½	.97	21.79	29.25	1.16	20.37
1915	5.50	1.00	.97	21.68	27.91	1.28	22.52
1916	8.00	1.32	1.50	27.60	31.58	2.45	30.25
1917	9.10	1.76	2.02	38.00	37.81	3.62	52.33
1918	10.98	2.48	2.16	46.68	43.33	3.00	58.68
1919	15.79	2.63	2.65	57.04	49.60	2.52	53.87
1920	18.00	3.52	3.15	71.17	66.50	2.45	71.77
1921	17.40	2.82	3.47	50.67	51.54	2.00	50.58
1922	16.91	2.43	2.79	49.41	51.83	1.70	46.42
1923	20.00	2.66	2.98	61.77	62.25	2.39	57.75
1924	18.00	2.50	2.88	55.17	59.00	2.19	54.33
1925	15.00	2.50	2.38	57.00	59.67	1.95	49.16
1926	17.00	2.50	2.18	60.33	62.17	1.93	48.50
1927	15.00	2.40	2.49	62.57	61.46	1.86	41.42
1928	14.00	2.30	2.30	63.33	61.34	1.87	35.92
1929	11.71	2.23	2.25	64.50	63.00	1.92	36.66
1930	10.88	2.19	2.25	64.33	60.64	1.71	37.00
1931	10.29	1.89	2.25	58.17	53.02	1.63	34.71
1932	9.75	1.62	2.25	39.91	41.33	1.56	30.58
1933	9.50	2.26	2.50	46.25	46.79	1.64	34.58
1934	10.87	2.48	2.50	57.17	58.92	1.78	41.00
1935	11.00	2.15	2.35	51.67	53.75	1.80	42.58
1936	12.00	2.26	2.80	56.75	57.75	1.84	43.00
1937	12.50	2.07	2.80	61.50	66.46	2.21	48.75
1938	13.10	2.12	2.80	59.33	62.75	2.18	48.33
1939	13.46	2.20	2.80	64.35	62.50	2.10	46.75
1940	13.50	2.20	2.68	67.39	65.46	2.10	49.00
1941	13.13	2.15	2.66	75.50	83.33	2.10	49.00
1942	14.17	2.20	2.80	85.61	98.33	2.10	49.00

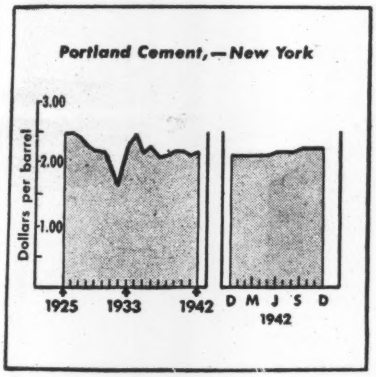
INDEX NUMBERS OF WHOLESALE PRICES—BUREAU OF LABOR STATISTICS

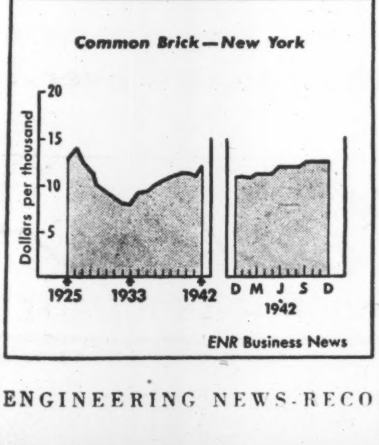
(1926 = 100)	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933
Building materials	110.2	103.2	94.8	90.5	90.3	95.2	86.7	85.3	86.2	77.0
Brick and tile	98.0	93.7	90.5	91.4	91.0	93.5	88.7	89.4	90.2	79.2
Cement	94.0	92.0	90.8	91.3	90.3	89.0	92.2	92.7	93.1	88.1
Lumber	132.8	122.5	102.9	93.2	87.4	99.7	87.0	81.1	84.5	70.7
Paint and paint materials	100.3	91.4	85.7	82.8	81.3	83.4	80.1	79.8	79.5	73.3
Plumbing and heating	95.4	84.8	80.4	79.2	78.5	78.8	75.0	68.9	72.6	67.1
Structural steel	107.3	107.3	107.3	107.3	111.0	113.2	95.0	92.0	90.8	83.1
Other building materials	103.5	98.3	93.3	90.3	92.7	99.1	90.2	90.1	90.3	82.7

MATERIAL PRICE TRENDS



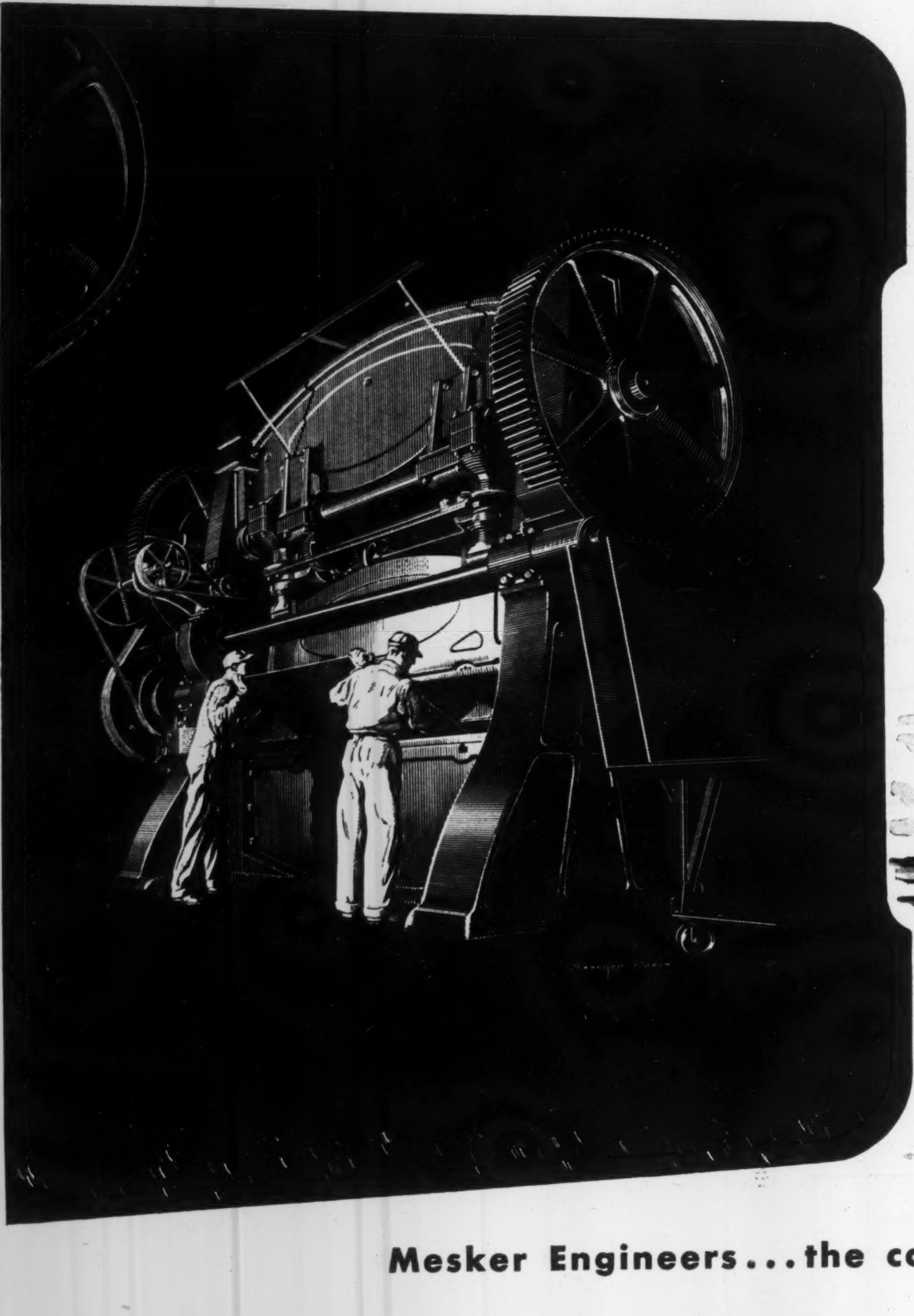






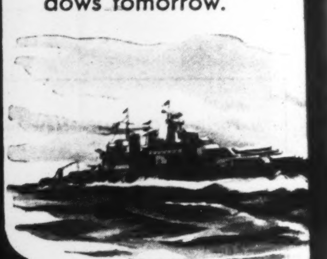
ENR Business News

EVERYTHING WE ARE DOING TODAY



Some Facts We'd Lik
You To Know About
Mesker's New Facili

200-Ton Presses, like
"Big Bertha", can be fou
in more than one plant. N
so common are its ma
new uses that Mesker m
are daily devising, to
pedite war production tod
. . . contribute to better w
dows tomorrow.

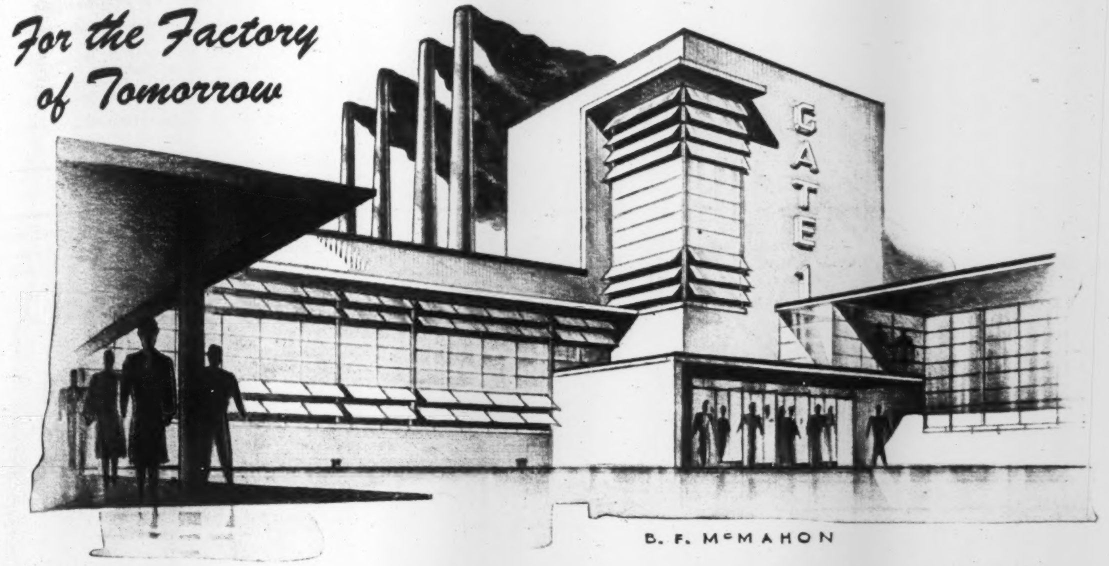


Mesker Engineers . . . the country over . . .

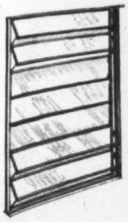
YESTERDAY AND TOMORROW
CASEMENT WINDOWS · MONUMENTAL WINDOWS · INDUSTRIAL WINDOWS · SCREENS · INDUSTRIAL DOORS · DETENTION WINDOWS · REINFORCING MESH GRATING . . . plus tomorrow . . . some other interesting new products!

Mesker
424 SOUTH SEVENTH STREET

DESIGNED TO HELP YOU TOMORROW



MESKER METAL WINDOWS



Ever hear of a draft-less, yet 100% *low-cost* ventilated, perfectly natural-lighted factory? Industrial designers have been working toward it for years. For, after all, *windows ARE cheaper than walls.* Properly distributed by the designer in long horizontal runs, they provide abundant natural light and low-cost ventilation; properly weather-conditioned, they assure excellent insulation. Architect McMahon's Factory, planned for Tomorrow, will *be* such a factory. The windows that will make it possible will be a direct outgrowth of the acilities, techniques and processes now being developed in a plant all-out on war production. The "Window Of The Future" is today's window WITH a future . . . *Mesker Metal Windows.* They'll be worth waiting for.

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TODAY

STEEL AMMUNITION CASES · PRE-FABRICATED STEEL AIRPLANE RUNWAYS · OIL AND WATER STORAGE TANKS FOR THE NAVY'S FIGHTING SHIPS . . . other products which necessarily must remain military secrets.

Materials and Labor Prices, December, 1942

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

DECEMBER CONSTRUCTION material prices reveal only minor changes from last month's levels. Paving brick is up $3.00 per M in Baltimore, and wood paving block is higher in Philadelphia and Minneapolis as a result of increased impregnating oil prices. Sand, gravel and ready-mixed concrete are higher in Detroit due to greater difficulty in obtaining in winter, and in the latter case for heating. Sand is up 5c. per ton in Montreal, the only change in the Canadian city.

Short leaf yellow pine is up $1.00 to $1.50 per M ft. in St. Louis. Both Douglas fir and long-leaf yellow pine timbers are higher in Boston. Treated and untreated railroad ties are also higher there. Concrete sewer pipe is off 10c. per foot on the 12-in. size in St. Louis, but up 50c. on the 24-in. size.

Construction wage rates for both common and skilled labor are unchanged from a month ago in all reporting cities.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE Ready Mixed 1:2:4, 50 c.y. or more, delivere
	Cloth Bags *a*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$8.04
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.25
Birmingham	2.50	2.25	....	1.75	1.75	1.50	.85	1.00	.90	1.15	5.80
Boston	2.75*b*	2.50*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.39	2.14	....	1.50*i*	1.50*i*	1.30*i*	1.75*i*	1.75*i*	1.75*i*	1.75*i*	7.30*n*
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	6.20
Denver	3.08	2.88	....	1.20	1.40	1.25	1.65	1.75	....	....	7.25
Detroit	2.40	2.15	1.95	2.50	2.25	1.65	2.25	2.25	2.00‡	2.00‡	7.00
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	7.50*n*
Los Angeles	2.80*v*	2.20*v*	....	1.20	1.20	1.15	1.15*f*	1.20*f*	....	....	6.65
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	7.35*j*
Montreal	....	1.95*rs*	1.79*rs*	....	....	1.30‡*t*	1.20‡*ct*	1.30‡*ct*	....	....	7.90*ls*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	....
New York	2.66‡	2.41‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	7.25*k*
Philadelphia	2.31	2.07	1.87	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	8.20
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	8.00
San Francisco	....*u*	2.22	1.92	1.36	1.36	1.36	1.46	1.46	....	....	7.55
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 25c per. c. y. for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash *n* 25 c.y. or more *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u*. Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 10c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration		CUTBACK ASPHALT Per ton		ROAD OILS Per gal.	ASPHALT EMULSION (Quick-breaking) Per gal.	
	Granite per M. lots of 50,000 4x4x8 in.	Brick per M. 3x4x8½ in. carload lots	Wood per sq. yd. 3½ n. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.40*e*	$24.62*e*	$0.0787*e*	$0.1309*e*	$0.0826*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1384
Baltimore	150.00‡	48.00‡	80.00*m*	15.00	21.00	.06	.09	13.00	23.00	.065	.07	.14
Birmingham	......	32.00*j*	....	17.95	.....†	.0747	......†	.0834*h*	......†	.065	.09	.....†
Boston	85.00	55.00	3.75	14.00	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.12‡
Chicago	150.00	55.00	2.20*d*	14.80	20.80	13.00*g*	18.50*g*	.0625*h*	.15*h*	.05*n*	.08	.12/.14
Cincinnati	112.00	37.50	....	16.40	.....	.085	......	12.25	......	.07	.085	.....
Cleveland	110.00	38.50	2.25	20.00	25.00	.09	.155	.10*h*	15.00	.07	.11	.15
Dallas	......	36.00	....	13.25	20.30	.06	.11‡	16.00	24.80	.06	.05/.07	.07/.09
Denver	......	27.50	....	.....	.....	......	......	......	......	......	......	......
Detroit	......	37.50	....	15.10*f*	22.60*f*	.0725	.1262	15.10	21.10	.067	.0725	.1262
Kansas City	......	40.00	....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	......	50.00	....	6.50*b*	15.00	6.50*bg*	15.00*bg*	5.50*b*	......	.0192	.0525	.1125
Minneapolis	......	.....	2.30*d*	.....	27.70	......	.126	......	32.64	......	......	......
Montreal	......	.....	....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
New Orleans	......	.....	....	13.00*a*	19.00*a*	.055	.085	.06*h*	.09*h*	......	.078	......
New York	......	.....	....	16.40	23.50*p*	.064	.124*p*	.07*h*	.13*hp*	.0675	.0725	.1225*p*
Philadelphia	130.00	58.00	4.06	14.00	.....	.055	......	.065*h*	.....	.055	.065	......
Pittsburgh	135.00	38.75	....	.....	.....	......	......	......	......	......	......	......
St. Louis	......	37.00	....	15.00*n*	21.00*n*	14.00*gn*	20.00*gn*	.065*hn*	.11*hn*	.05*n*	.09*n*	.8125*n*
San Francisco	......	70.00	....	9.50	18.00	9.50*g*	18.00*g*	10.00	17.50	9.50*g*	.0525	.1125
Seattle	......	60.00*c*	....	9.50*i*	18.00*i*	....	19.00*gi*	10.00*i*	......	9.50*i*	.0575*i*	.0675*i*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *m* Per thousand. † Available on priority only and quoted specially. *n* September price, none later available. *p* No steel drum shipments except to armed forces.

MEDUSA (the original)
WHITE PORTLAND CEMENT
Used by
ENGINEERS
the world over

Over a period of thirty-five years, "Medusa White," the original White Portland Cement, has been used by engineers in most of the civilized countries of the world. We are proud of this distinction because such wide-spread use of a product is not "happenstance," but reflects the success of this White Cement in a wide variety of uses. In addition to practically every country in the western hemisphere, Medusa White has been widely used in Europe, India, South Africa, Australia, New Zealand, Hawaii, Japan, China and Thailand, etc.

And the uses engineers find for Medusa White are almost as numerous as the countries that use it. It has been proved successful in stucco, concrete, terrazzo, cast stone, white tile, white faced concrete block, cement tile and cement asbestos shingles. In recent years engineers have also used Medusa White in the floors of bomber plants and in curbs for highways because of its high light reflecting value. No other building material lends itself so well to light reflection, sanitation, color and beauty as Medusa White. Write today for literature on Medusa White, the original White Portland Cement.

MEDUSA
PORTLAND CEMENT COMPANY
1001 Midland Building • Cleveland, Ohio
Also made by Medusa Products Company of Canada, Ltd., Paris, Ontario

STUCCO
CAST STONE
TERRAZZO
WHITE FLOORS OF BOMBER PLANTS
BRIDGE ABUTMENTS
SAFETY CURBING
WHITE FACED CONCRETE BLOCK
CONCRETE SLABS
CONCRETE PRODUCTS

December, 1942

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ½-in. billet b	RIVETS ¾-in. structural	WIRE NAILS Base d	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes c	Tie Plates c	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47a	2.52a	.....	.....	2.85a	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75a	2.80a	.....	.....	2.95a	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. a F.o.b. cars dock. b Rail steel same as billet prices. c Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. d Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ½ in., base price 15 tons or over b New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	......	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10a	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10a	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53cd	2.53cd	......	.05	19.50	21.50	1.66	1.25	.1566	....
Cleveland	2.10a	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
Dallas	4.25	3.17	3.17	......	....	25.00	27.50	1.93	1.42	.1827	....
Denver	4.35	3.95	3.85	......	....	26.50	28.50	1.97	1.45	.1863	....
Detroit	3.65‡	2.52‡	2.52‡	......	.10	23.00	25.00	1.68	1.26	.1584	2.66
Kansas City	4.00	2.64cd	2.64cd	.0	.05	19.60	23.60	1.78	1.33	.1683	2.89
Los Angeles	3.65f	2.84	2.69	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.80‡	2.75	2.75	.0	.10	25.00	27.00	1.80	1.34	.1701	2.75d
Montreal	4.00i	2.90i	2.80i	......	.....	26.00hij	33.00hij	2.56i	3.14i	.268i	....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1719	2.875
New York	3.75	2.76c	2.76c	......	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.65	3.85	....	......	....	19.50	21.50	1.71	1.28	.1611	2.74
Pittsburgh	2.10a	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.69	2.75	2.75	.0	.05	28.00	34.00	1.69	1.2[illegible]	.1602	2.70
San Francisco	4.35	2.825	.....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75e	2.50e	.....	......	.....	34.50	38.50	1.93	1.42	.1827	2.95d.

‡ Delivered. a Mill prices. b 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. c 20 tons or over Base. d Mill price plus freight. e F.o.b. dock. f Includes delivery in free delivery zone. g Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. h List price. i Plus Dominion and Province sales tax. j August price; not on market.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

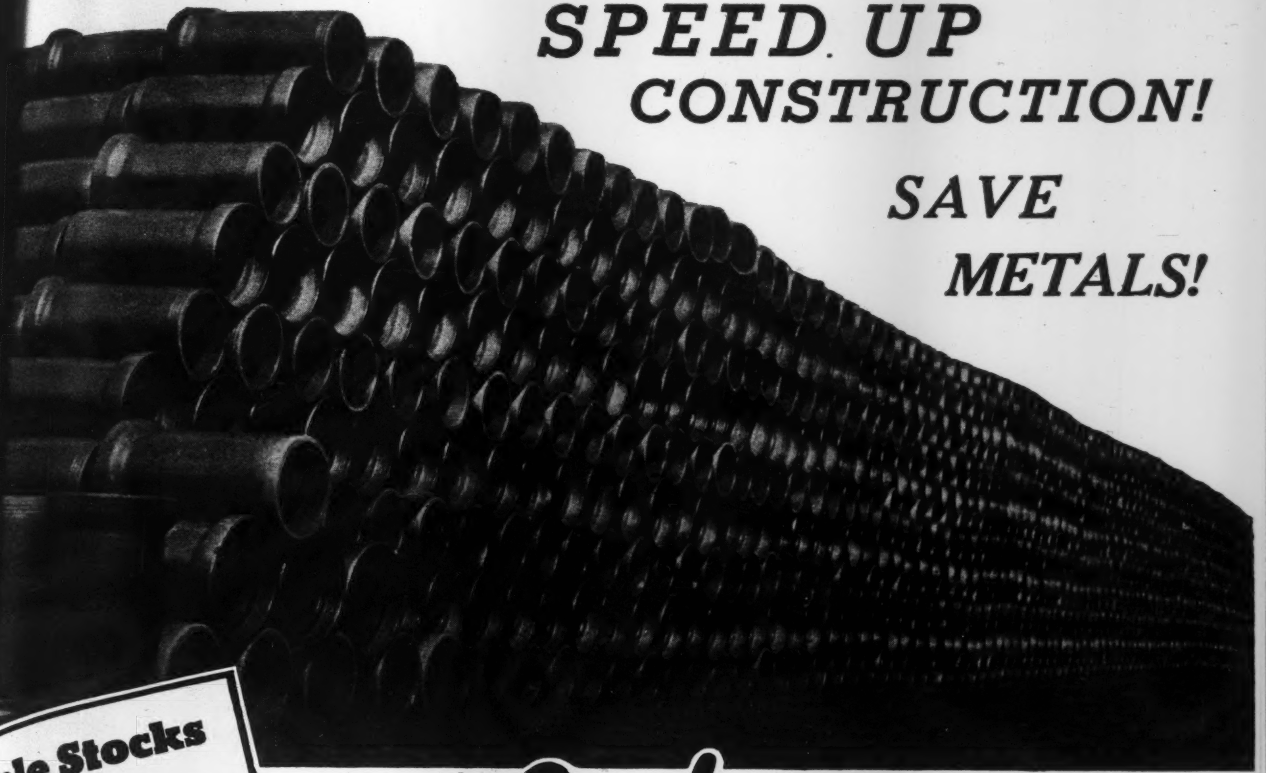
	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in. a	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, h 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
Atlanta	$49.66	$0.26b	$0.468bc	$1.8525	$4.68c	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	55.40	.26	.463	2.07	5.85	140.00	......	.70	....	64.1	56.1	61.6	53.1
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	57.1	43.4	54.0	39.6
Cleveland	54.75	.203	.3915	1.665	5.125	81.00	125.00	.30	1.60	67.8	59.8	65.3	56.8
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	61.56	.29†	.52†	2.16†	....	130.00	240.00	....	....	58.4	50.4	55.7	47.2
Detroit	54.75	.245	.4725	1.935	5.14	82.50	131.25	.35	1.50	57.7	44.0	54.8	40.6
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.8	46.3	46.0	59.7
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.60	192.50	1.00	2.00	59.6	51.6	57.0	48.6
Minneapolis	59.00	.275†	.495†	1.98†	5.14†	......	......	.90	2.10	64.2	56.2	60.7	52.2
Montreal	60.00	.85	1.50	5.25	8.50e	45.00m	64.00m	.48m†	1.92m†	....	....	....	....
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.40	2.10	62.4	54.4	58.8	50.3
New York	52.40	.455	.8775	2.925	7.65	......	......	.60	1.40	64.7	53.7	62.2	50.7
Philadelphia	51.00	.28	.54	2.30	6.75	150.00	225.00	.45	1.75	56.4	42.6	53.3	38.9
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85g	2.00g	68.5i	57.5i	66.0i	54.5i
St. Louis	52.84	.28	.504	2.016	4.50	85.00	220.00	.90j	2.00k	56.4	42.6	52.5	38.1
San Francisco	68.40	.3625d	.6525d	2.61	6.52	115.50	192.50	.58	2.34	46.0	32.0	42.0	27.0
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51f	1.44f	....	....	....	....

‡ Delivered. † F.o.b. a B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. b Double strength. c List to dealer. d List. e 30-inch. f Less 5% for cash. g Culvert pipe. h Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92.

i Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv, 14½; 4½ in. to 8 in. black, 32½ galv. 17. j Reinforced; spec. C 76–37. k Reinforced; spec. C 75–37. l Plus sales tax. m Tax included.

SPEED UP CONSTRUCTION!

SAVE METALS!



ple Stocks of Pipe in All Sizes

Robinson

VITRIFIED CLAY PIPE

Extra Strength
Vitrified Clay
SEWER PIPE
Saves Metals Essential for the
War Effort

●

Vitrified Clay
SKIP PIPE
(Cradle Invert Type)
UNDERDRAIN
Carries off More Water,
Faster, Than Any Other

CLAY PIPE costs less to lay—releases metals for vital war needs. Protects the job against delay. Insures the contractor against penalties. Our large stocks of vitrified clay pipe are available in nearly a score of strategic locations. Telephone, wire or write our office nearest you.

ROBINSON CLAY PRODUCT COMPANY - AKRON, OHIO

FACTORIES: PARRAL, MIDVALE, MOGADORE AND MALVERN, OHIO; CLEARFIELD AND POTTSTOWN, PENNSYLVANIA

SALES OFFICES AND WAREHOUSES

KRON, OHIO
Second National Bldg......FRanklin 3151
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1620 Baltimore Trust Bldg....CAlvert 3131
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5835 W. Touhy Avenue...NEWcastle 5700
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170 Tolland Street..........Phone: 8-1447
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1013-15 East 21st St.........WAbash 1507
MOUNT VERNON, N. Y.
160 MacQuesten Parkway, N.
FAirbanks 4-1514 and OAkwood 8686
NEW YORK, N. Y.
Architects Bldg........MUrray Hill 3-7550
Warehouse, 56-24 Flushing Ave.
Maspeth, (L. I.)........EVergreen 7-6464

PHILADELPHIA, PA.
1083 Broad St. Station Bldg.
RITtenhouse 6210
ROCHESTER, N. Y.
600 Buffalo Road............Genesee 4385
SYRACUSE, N. Y.
Sand and Spencer Sts.......Phone: 2-9226
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Shaftesbury Ave...........KIngsdale 6177
WASHINGTON, D. C.
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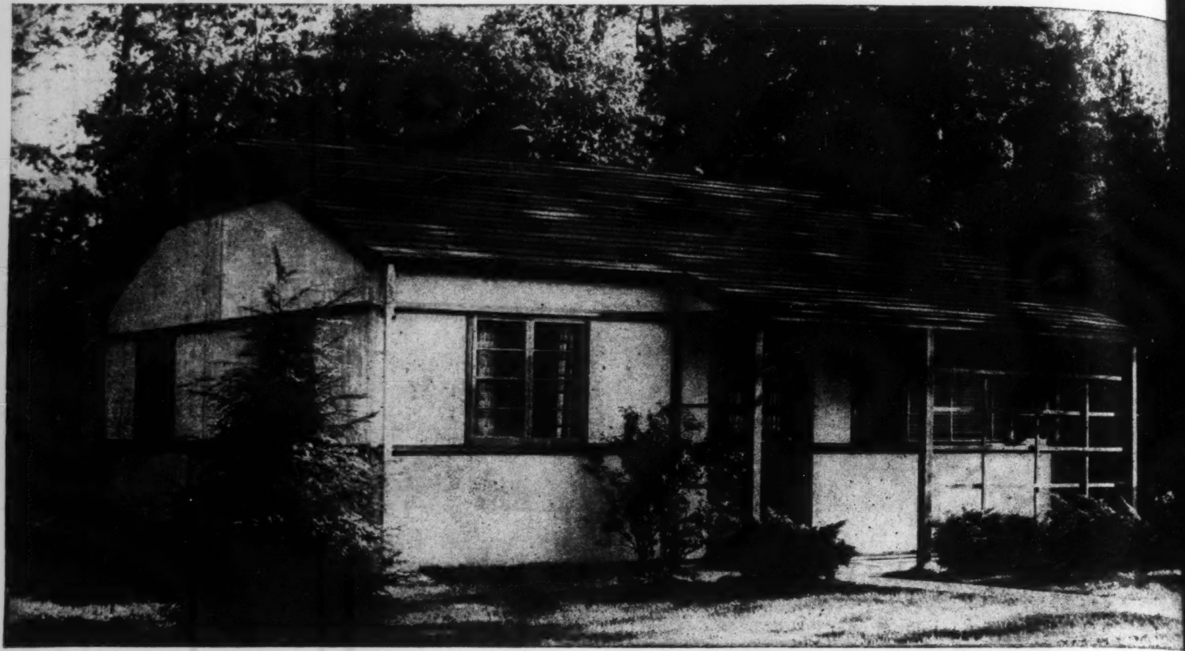
Phone: North 9834

e Emergency Demands CLAY ALL THE WAY

Twenty million dollars

ALREADY COMPLETE



Meet All Government Requirements as to Critical Materials, Structural Stability and Heat Loss Factors

Ideally Suited for Operative Builder Developments or Group Housing by Industries

SHOP FABRICATION OR SITE ASSEMBLY METHODS WILL BE EXPLAINED BY CELOTEX ENGINEERS

CEMESTO combines exterior and interior finish, plus insulation, in a complete fire-resistant wall unit of remarkable structural strength. Celo-Roof combines sheathing, insulation, and roofing. These two new multiple-function products and the Cemesto house they have made possible are the results of twelve years' research.

Up to now more than twenty million dollars' worth of Cemesto homes have been completed and occupied. More are under construction. And these are all *sturdy* homes, speedily and economically built because they are pre-engineered for mass production.

The Cemesto house makes use of ideas used in prefabrication to cut construction costs to a minimum. It meets rigid government requirements as to critical materials, heat loss factors, and structural stability. It is ideally suited to any project involving group housing. A Celotex engineer will gladly call to present full particulars if you will write us describing the project you have in mind.

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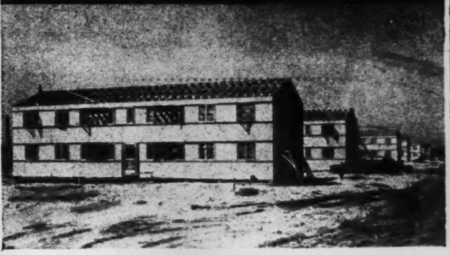
INSULATING WALL UNITS

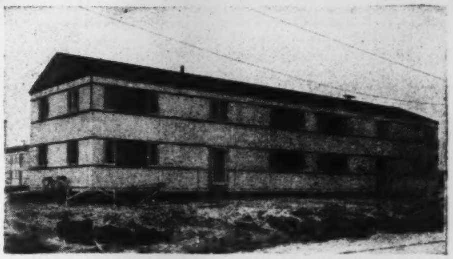
THE CELOTEX · CORPORATION

ars worth OF CEMESTO HOMES
TE ND OCCUPIED!

These Are Typical Cemesto Projects Now Being Completed



Part of extensive Cemesto housing project now nearing completion in Alabama.

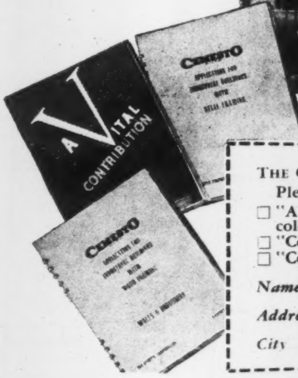


Another view of the Alabama Cemesto housing project, walls and roof completed.

Cemesto houses in big Mississippi development, built in rows to cut costs and speed completion.

Sturdy, Comfortable, Economical Homes for Thousands of War Workers

12 Great Housing Projects In These States: **Maryland, Florida, Michigan, Mississippi, Alabama, Texas, and the District of Columbia. Also in Alaska.**



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THE CELOTEX CORPORATION, CHICAGO ENR 4-22-43
Please send FREE booklets as checked:
☐ "A Vital Contribution"—28-page booklet in full color telling the Cemesto story.
☐ "Cemesto with Wood Framing"
☐ "Cemesto with Steel Framing"
Name ____________
Address ____________
City ____________ *State* ____________

CHICAGO

December, 1942

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)
All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)

LONG LEAF Y. P. Merchantable grade up to 20 ft.

PLYWOOD Rail freight increm (See note for base pr

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR									LONG LEAF Y. P.		PLYWOOD	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	5/8"	3/4"
Atlanta	**$29.00**	**$28.00**	**$29.00**	**$27.00**	**$28.00**	**$29.50**	**$40.00**	......	......	$60.00	$70.00	$17.90	$21.85
Baltimore	**40.00**	**42.00**	**40.00**	**40.00**	**41.00**	**44.00**	**60.00**	......	......	110.00	115.00	18.25	22.25
	45.00	*46.00*	*52.00*	*52.00*	*52.00*	*52.00*	*68.00*	*$72.00*	*$72.00*	......	......	......	......
Birmingham	**34.50**	**34.50**	**32.00**	**32.00**	**32.00**	**34.00**	**53.00**	**53.00**	**56.00**	......	......	17.35	21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	......	......	67.50	70.00	......	......
Boston ‡*	70.00[2]	70.00[2]	60.00[3]	60.00[3]	87.00[1]	100.00[1]	115.00[1]	......	......	125.00	150.00	18.25	22.25
‡*	*55.00*	*55.00*	*60.00*	*65.00*	*65.00*	*80.00*	*100.00*	*100.00*	*100.00*	......	......	......	......
Chicago	**42.00**	**43.00**	**41.00**	**40.00**	**41.00**	**42.50**	**60.00**	......	......	80.00	95.00	14.60	17.80
	46.00	*46.00*	*47.50*	*47.00*	*47.00*	*48.00*	*57.00*	*56.50*	*58.00*	......	......	......	......
Cincinnati	**41.00**	**42.50**	**39.00**	**40.50**	**42.00**	**43.00**	**53.00**	......	......	65.00	68.00	17.35	21.15
	......	......	......	......	......	......	*55.50*	*55.50*	*55.50*	......	......	......	......
Cleveland	**42.50**	**43.50**	**41.50**	**43.50**	**45.00**	**47.00**	**53.00**	57.00	57.00	90.00	93.00	17.75	21.60
Dallas e	**39.50**	**40.50**	**39.50**	**38.00**	**38.50**	**39.50**	**53.00**	**53.00**	**53.00**	78.00	83.00	14.60	17.80
Denver ‡	54.00[4]	52.00[4]	55.00[4]	55.00[4]	55.00[4]	56.00[4]	59.00[4]	*73.00*	*79.00*	......	......	10.45	12.70
Detroit	**44.00**	**44.00**	**44.00**	**43.50**	**44.00**	**46.00**	**60.00**	......	......	53.00	63.00	17.35	21.15
	......	......	......	......	......	*51.50*	*55.00*	*60.00*	*60.00*	......	......	......	......
Kansas City	**50.00**	**55.00**	**52.00**	**52.00**	**52.00**	**55.00**	**65.00**	......	......	75.00	85.00	12.60	15.40
	50.00	*55.00*	*52.00*	*52.00*	*52.00*	*55.00*	*65.00*	*80.00*	*80.00*	......	......	......	......
Los Angeles a	*55.00*	*55.00*	*53.00*	*53.00*	*51.00*	*51.00*	*57.00*	*65.00*	*56.00*	......	......	9.90gh	12.05
Minneapolis ‡b	49.00[8]	49.00[8]	......	......	......	......	......	......	......	......	......	12.60	15.40
‡	*53.00*	*53.00*	*53.00*	*52.00*	*52.00*	*53.00*	*59.00*	*61.00*	*61.00*	......	......	......	......
Montreal †[7]	*43.00*	*46.00*	*42.00*	*45.00*	*47.00*	*54.00*	......	......	......	200.00	200.00	......	......
	42.50	*42.50*	*45.25*	*47.25*	*48.25*	*46.75*	*50.75*	*50.75*	*50.75*	......	......	......	......
New Orleans	**31.50**	**31.50**	**33.75**	**31.75**	**34.00**	**35.00**	**48.00**	......	......	69.00	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	......	......	......	......	......	......
New York ‡	**50.00**	**51.00**	**51.00**	**50.00**	**51.00**	**54.00**	**62.00**	......	......	120.00f	125.00f	18.35	22.25
‡	......	......	*65.00i*	*65.00i*	*65.00i*	*65.00i*	[Range from $75 to $95]			......	......	......	......
Philadelphia	**48.00**	**49.00**	**48.00**	**48.00**	**49.00**	**52.00**	**54.00**	......	......	82.00	87.00	18.25	22.25
	54.00	*54.00*	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*75.00*	*75.00*	......	......	......	......
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	......	......	......	......	18.10	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	......	......	......	......
St. Louis ‡c	**50.00**	**50.00**	**48.00**	**47.00**	**48.00**	**51.00**	**65.50**	*71.00*	*71.00*	83.00	70.00	14.60	17.80
San Francisco d	*35.50*	*35.50*	*37.00*	*37.00*	*36.50*	*36.50*	*40.50*	*49.50*	*49.50*	......	......	7.30g	8.90g
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	......	......	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

NOTE: Special concrete form grade Fir Plywood, 4′ by 8′ panels, 5-ply, sande 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surfac Seattle base price on 5/8″, $86.50; on 3/4″, $95.30; price includes oiling and se ing charges. For other centers add rail freight increment from table or prop size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by wat shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness		EXPLOSIVES Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
	A quality	B quality	
Atlanta	75%	75%	$0.15
Baltimore	78%	79%	.15
Birmingham	76%	76%	.105
Boston	77%	78%	.15
Chicago	77%	77%	.15
Cincinnati	77–10%	77–10%	.15
Cleveland	77%	77%	.19
Dallas	76%	76%	.1625
Denver	76%	76%	.155e
Detroit	77%	77%	.15
Kansas City	76–10%	76–10%	.155
Los Angeles	86%d	88%d	.1575
Minneapolis	77%	77%	.155
Montreal	40–5%‡	47%‡	.1675†
New Orleans	70%	75%	.16
New York	81%	82%	.22f
Philadelphia	78%	79%	.15
Pittsburgh	79%	79%	.1225
St. Louis	76–10%	76–10%	.155
San Francisco	66–15%	73–15%	.155
Seattle	75%	75%	.1575†

Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb.
(except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered fro barge 1½ to 2c. per ft. additional:

			Short Leaf	
Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.23	$0.26
12 in.— 2 ft. from butt	6 in.	50 to 59 ft.	.26	.28
12 in.— 2 ft. from butt	6 in.	60 to 69 ft.	.31	.33
14 in.— 2 ft. from butt	6 in.	50 to 69 ft.	.28	.33
14 in.— 2 ft. from butt	6 in.	70 to 79 ft.	.31	.37
14 in.— 2 ft. from butt	5 in.	80 to 85 ft.	.40	.48
14 in.— 2 ft. from butt	5 in.	85 to 89 ft.	.45	.53

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6″x8″x8′		7″x9″x8′6″	
		Untr.	Tr.	Untr.	Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00a	2.50	$3.50a
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.20	3.25
Birmingham	White Oak	1.00	1.60a	1.30	2.25a
	Southern Pine	....	....	....	....
Chicago	Red Oak	....	2.40a	....	3.00a
	Southern Pine	....	....	....	....
Los Angeles	Douglas Fir	1.10	1.75a	1.60	2.50a
Philadelphia	Red Oak	....	2.10a	....	3.25a
St. Louis	White Oak	1.65*	....	1.90*	....
	Red Oak	1.55*	2.15a*	1.90*	2.70a*
	Sap Pine or Cypress	1.35*	....	1.70*	....
San Francisco	Douglas Fir	1.15bef	....	....	3.00caf
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6″ x 8 x 8′6″. *c* Empty cell. *d* Zinc. *e* Green. *f* F. o. b. cars. † Out of market. * September price, none later available.

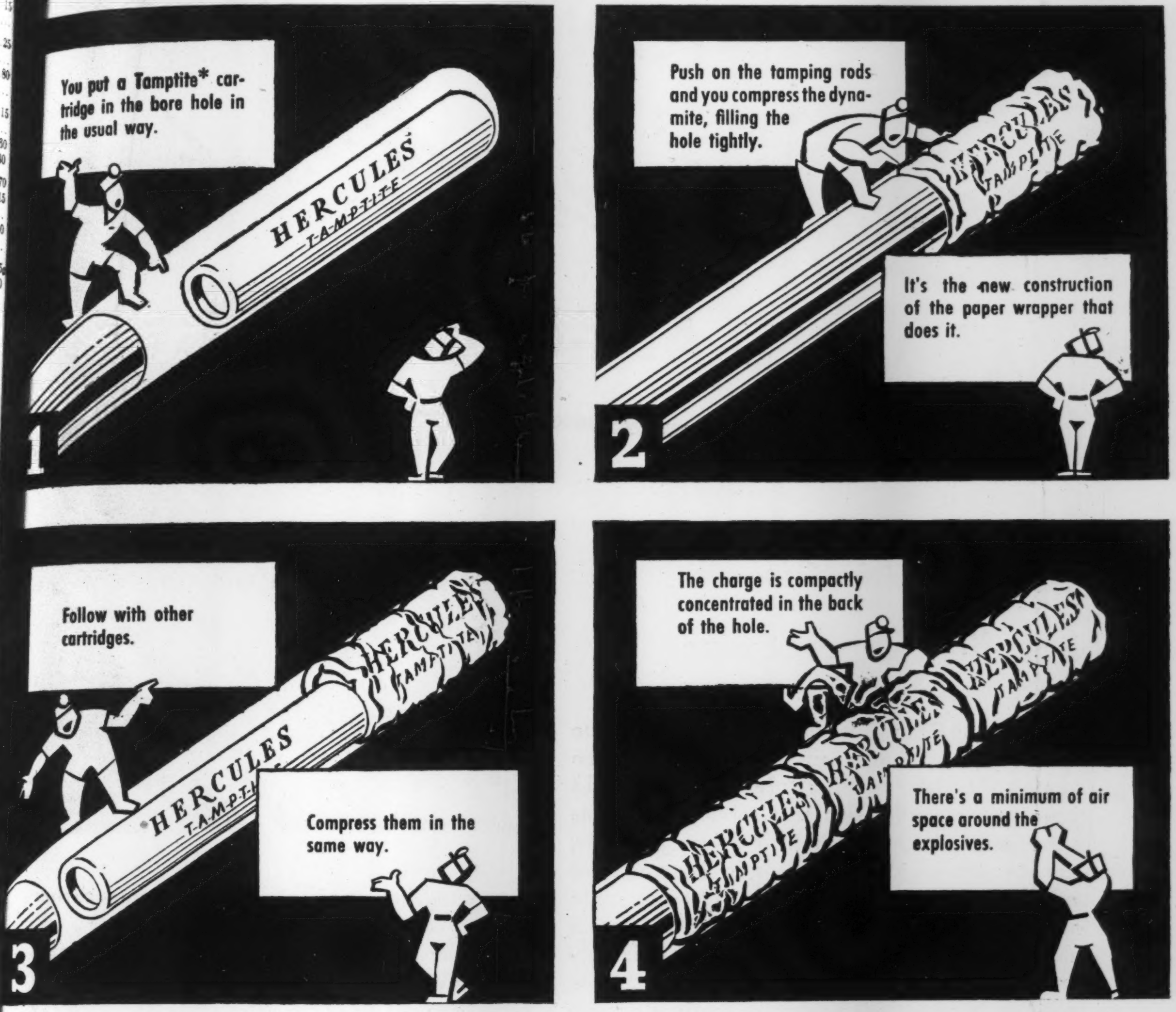
CHEMICALS

Water, sewage treatment road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.25– 3.10
Chlorine cylinders, liquid, per lb. delivered	.0525
Calcium chloride, 77–80%, flaked, in 100-lb. paper bags, delivered, per ton	18.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb	5.15– 5.50

NEW TAMPTITE CARTRIDGE

peeds work · saves labor · gives better breakage


You put a Tamptite* cartridge in the bore hole in the usual way.
HERCULES T-A-M-P-T-I-T-E
1
Push on the tamping rods and you compress the dynamite, filling the hole tightly.
HERCULES TAMPTITE
It's the new construction of the paper wrapper that does it.
2
Follow with other cartridges.
HERCULES TAMPTITE
HERCULES T-A-M-P-T-I-T-E
Compress them in the same way.
3
The charge is compactly concentrated in the back of the hole.
HERCULES TAMPTITE
There's a minimum of air space around the explosives.
4

RESULTS: You save valuable man hours formerly used in slitting cartridges to make them pack tightly. There's no spilled powder, even when loading uppers. You get better breakage for faster mucking.

ORDER HERCULES EXPLOSIVES IN TAMPTITE CARTRIDGES

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INCORPORATED
940 KING STREET · WILMINGTON · DELAWARE

*Reg. U. S. Pat. Off.

A-92

PLANNED TO WITHSTAND *Atmospheric Attack* AS WELL AS IMMERSION

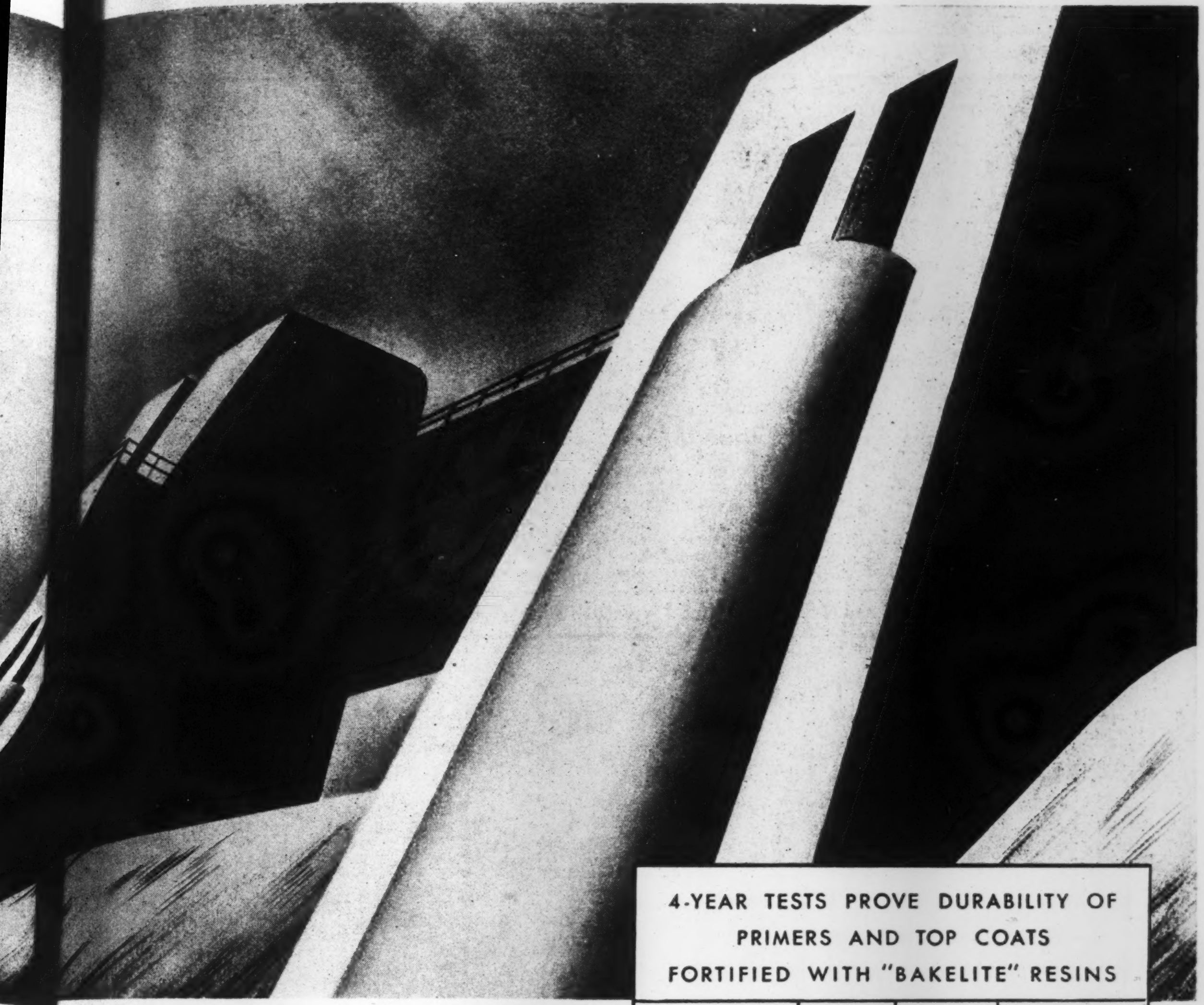
. . . with the aid of Bakelite's laboratories

On a typical Ohio River dam, approximately one quarter of a million square feet of steel has to be protected against corrosion and erosion. This would be a task gigantic enough if service conditions were identical throughout the structure. But, with certain parts subjected to atmospheric attack, and others totally submerged or exposed to alternate wetting and drying, surface protection becomes a doubly severe problem. Here, as in other important government developments, engineers must necessarily plan their protective coatings *as part of the structure.*

At the Montgomery Island Dam, for example, widely varying service conditions have long been met satisfactorily with metal coatings based on 100% BAKELITE Resins. As the result of close cooperation between Bakelite's Laboratories, government engineers, and paint manufacturers, these finishes provide the highest degree of protection against not only weathering, but also the action of flood water, ice, debris, and industrial pollution. By careful study of all factors involved, protective finishes now last for years, whereas earlier types of coatings failed in months.

Further proof of the durability of BAKELITE Resin Coatings is provided by large-scale tests conducted on one of the gates at the Montgomery Island Dam. Various types of finishes were applied to this gate in 1938, and most of them were removed after inspection in 1941. Of the ten test paints still remaining at the end of 1941, eight were made with a BAKELITE Resin. Outstanding among these was a system employing two coats of primer, followed by two coats of gray enamel—all coats based on BAKELITE Resin. Even after four years' atmospheric exposure and immersion, this system revealed no peeling and no appreciable rusting.

RESIN-BASE COATINGS PLANNED AS PART



4-YEAR TESTS PROVE DURABILITY OF PRIMERS AND TOP COATS FORTIFIED WITH "BAKELITE" RESINS

PAINT SYSTEM	ATMOSPHERIC EXPOSURE	WATER LINE EXPOSURE	IMMERSION
2 coats primer 2 coats gray enamel	O.K.	O.K.	Slight rust on rivet heads only because of abrasion. Main exposed area O.K.
2 coats primer 2 coats gray enamel	O.K.	Slight peeling of top coat.	Slight rust on rivet heads only because of abrasion. Main exposed area O.K.
1 coat primer 2 coats aluminum paint	O.K.	O.K.	Slight rust on rivet heads and other sections.
1 coat primer 2 coats aluminum paint	O.K.	O.K.	No rust on rivet heads. Slight rust elsewhere.

Bakelite's Laboratories will be glad to supply further information on these and other types of durable finishes now made with Bakelite Resins, or to assist you in obtaining coatings that must withstand special conditions. Write to Department 8.

BAKELITE CORPORATION, 30 E. 42nd ST., NEW YORK

Unit of Union Carbide and Carbon Corporation

UCC

BAKELITE

TRADE MARKS

The word "Bakelite" and the identifying products Symbol are registered trade-marks of Bakelite Corporation

SYNTHETIC RESINS

OF THE STRUCTURE

December, 1942

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity. Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carlo Pulv or lu
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	15.00k	19.00k	18.00	13.00	2.
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.
Boston	89.35a	93.30a	178.70a	202.50	271.80	308.20	16.50i	19.50i	17.50†	12.50†	14.
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	17.50	17.50	15.50	13.00	
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	14.50j	13.25j	...
Dallas	62.50	67.00	135.00	162.00	212.50	263.00	13.50i	15.00i	19.00	15.00	3.
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	17.00	25.00j	17.00j	20.
Detroit	76.90	81.50	152.80	201.00	262.00	310.00e	17.50	18.00	16.60	14.00	14.
Kansas City	67.00	69.00	89.00c	128.00	163.00	189.00	15.00	16.00	19.32	13.00	10.
Los Angeles	73.50†r	89.50†r	128.00c†r	210.00†r	368.00†r	460.00†r	13.50	15.00	16.50	17.50	17.
Minneapolis	81.00b	86.40b	146.90b	......	177.00b	246.00b	13.60	15.60g	21.00	16.00	19.
Montreal	99.10a	105.65a	154.75a	104.65at	154.75au	155.25	22.00†u	27.25†u	24.60u	18.00u	13.
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.
New York	78.40	83.60	115.00c	193.30h	238.80h	295.60h	15.00	.....	20.00	14.00	17.
Philadelphia	90.00	97.70	183.20	197.10	243.20	301.10	17.00	20.00	15.50	8.55	10.
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	18.
San Francisco	84.00	94.50	225.00	......	......	......	17.50	22.00	20.00	20.00	16.
Seattle	115.00	125.00	230.00	......	......	......	20.00f	21.00f	20.00s	20.00s	20.

† F.o.b. a Smooth. b Carload lots delivered to job. c 6x12x12 in. d Not load bearing. e 48 lb. tile. f Less $1.00, ½ cash 15 days, balance 30 days. g Selected common. h F.o.b. Perth Amboy, N. J. i F.o.b. Warehouse only. j LCL. k $1.00 discount if paid in 10 days. l Lump. m Per bbl., 180 lb. sack 100 lb. o Per bbl., 200 lb. p 280 lb. bag. r 5% discount 10 days. discount for cash. t 5½x8x12. u Plus 8% sales tax.

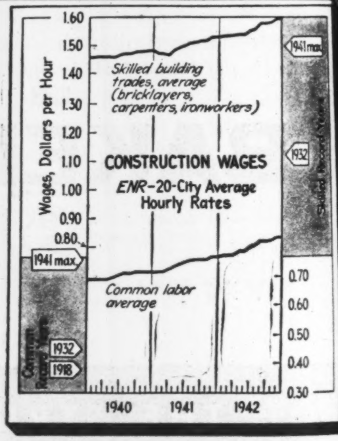
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in. 600-lb. (Approx.) bbl. Dry a	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum b	Ferric Oxide d	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pit 350 lb. per to
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.0
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.0
Birmingham	10.25	14.125	2.35	3.50r	1.98r	2.04	1.97	1.97	.32	28.1
Boston	10.00	13.75	1.55	....	2.25	2.12‡	1.72h‡	1.72h‡	.50‡	20.0
Chicago	10.00	13.75	....	....	....	1.75hf	1.66hf	1.82hf	.33f	23.0
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39h	2.39h	.36	21.00
Cleveland	10.00	13.75	2.10	4.80	1.95	1.93	1.83h	1.83h	.35	29.00
Dallas	10.00	14.50	1.88	2.11n	.05l	1.75h	1.66h	1.66h	.35	39.00
Denver	10.50	14.25	1.65	....	.27l	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.40	2.50	2.50	.35	22.00
Kansas City	10.00	13.875	2.39g	2.55gr	2.16gn	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75i	1.66hi	1.66hi	.32	23.00
Montreal	9.25	6.25	2.85p	4.70p	2.70p	2.85	2.58	2.07	.63	1.85
New York	10.00	13.75	2.03	....r	1.64	1.66	1.58h	1.58h	.26	25.00
Philadelphia	10.00	13.75	....	....	....	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94h	1.94h	.34	26.00
St. Louis	10.00	13.75	2.28	2.89	1.96	1.91	1.66	1.66	.28	23.00
San Francisco	10.25	14.00	1.80	2.75n	1.35/2.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16h	....	.35	26.50j

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. a Red lead prices change frequently due to pig lead price changes. b U. S. War Dept. Spec. 3–49A. c ASTM Spec. D266–31. d 80% minimum ferric oxide. e Subject to 25% discount. f Distributors' price to contractors. g 5 gal. h Per roll, 65 lb. i Minneapolis and vicinity. j Asphalt pitch. k Per 100 l Per lb. m Per bbl. n May, 1941 price, no later quotation available. p Pl 8% sales tax. r Not available, except on priority rating; then quoted special

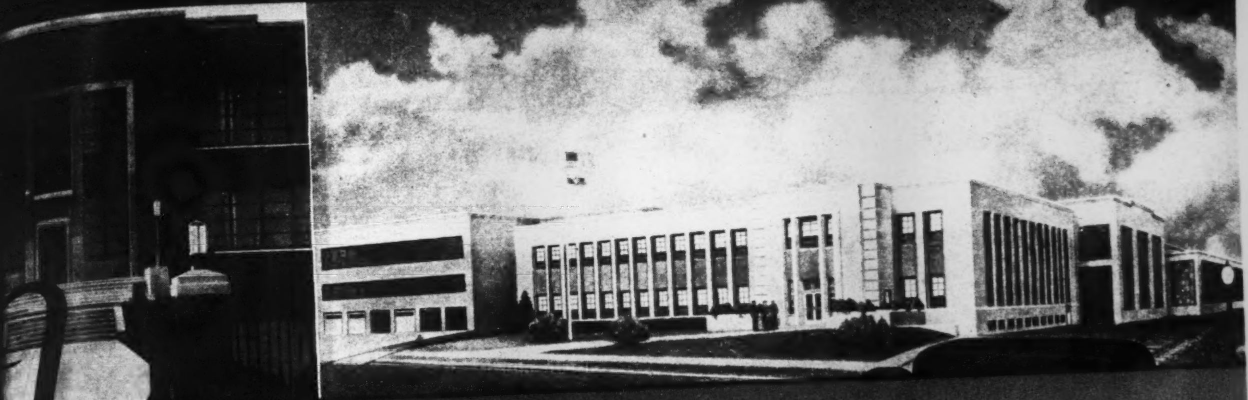
SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Heavy Const.
Atlanta	$1.375	$1.00	$1.375	$1.00/1.25	$1.25	$0.40	$0.50
Baltimore	1.625	1.375	1.80	1.625/1.80	1.50	.70	.70
Birmingham	1.75	1.125/1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.625	1.40/1.55	1.625	.80	.80
Cleveland	1.75	1.50	1.75	1.75	1.75	1.00	1.00
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65b	1.50b	1.625b	1.43b	1.51b	.80b	.80b
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.55
Los Angeles	1.50	1.50	1.50	1.50	1.667	.75	.75
Minneapolis	1.50	1.375	1.50	1.40	1.50e	.925	.925
New Orleans	1.50	1.25	1.50	1.375	1.375	.65	.65
New York	2.00b	1.85b*	2.00	2.00b	2.00c	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.50	1.75	1.5625/1.625	1.75	.80	.70
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875c	1.4375	1.75	1.50	1.75c	.95	.95
Seattle	1.715	1.415	1.615	1.565	1.715	1.015	1.10
Montreal	.965	.855	.90	.80	.945	.505	.505



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.599

b 7 hr. day. c 6 hr. day. d 35 hr. wk. e 30 hr. wk. *Negotiating now for increased rate. ENR Common Average: $0.834



Vital NEW MACHINE TOOL PLANTS

PROTECTED BY *Carey* BUILT-UP ROOFS

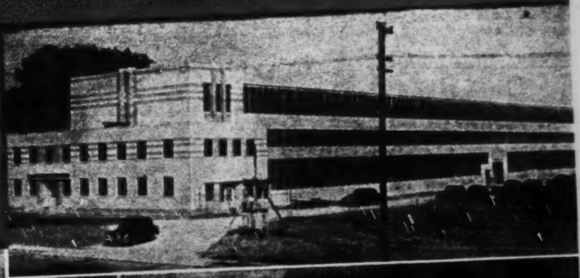
At many of the nation's great machine tool plants, as on every other industrial front, CAREY Built-up Roofs are rendering outstanding service by protecting buildings and equipment vital to the war program—worthy testimony to the DEPENDABILITY of these famous engineered roofs.

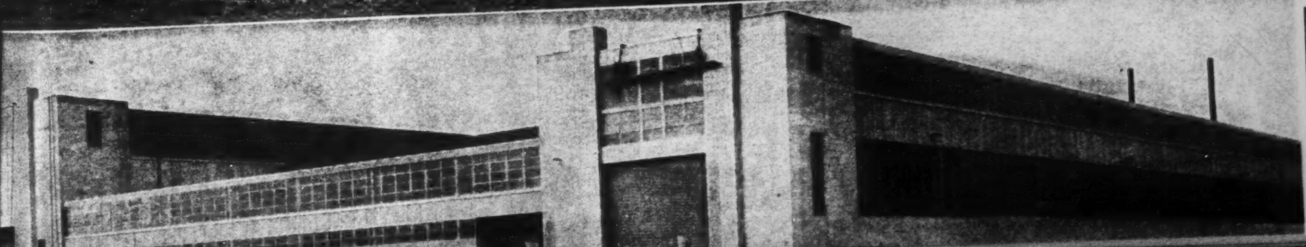
CAREY Roofs are individually designed to withstand temperature extremes, salt air, chemical fumes, and other conditions that adversely affect roof life. Normally, these time-tested roofs far outlive their bonded period of service. Make sure of maximum roof VALUE at minimum cost—specify CAREY. A nationwide organization of experienced roofing contractors is at your call. For details, address Dept. 30.

MACHINE TOOLS SET STAGE FOR VICTORY

Upon the machine tool industry was imposed the first tremendous job of equipping the nation for war. The way the industry responded — increasing production from 25,000 machines a year to 360,000—is a shining example of Democracy in action. Thanks to the vital ground work of this basic industry, America has accomplished more in two years than German dictatorship could accomplish in nine.

THE PHILIP CAREY MFG. COMPANY
Dependable Products Since 1873
Lockland, CINCINNATI, OHIO
In Canada: The Philip Carey Company, Ltd.
Office and Factory: Lennoxville, P. Q.





Construction Wage Rates and Trends

COMMON LABOR hourly rates in the construction industry reached a new all time high average of 80.4c., an 8.2 percent increase over the 1941 value. These rates, the average of twenty cities reporting to *ENR*, opened 1942 at 77.6c. per hour and closed at 83.2c.

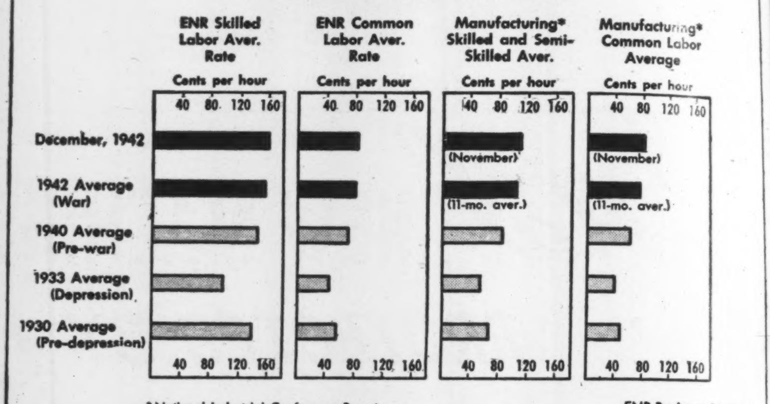
Skilled construction labor's average rate for the *ENR* 20-cities was $1.531 at the beginning of 1942 and by December had climbed to $1.599 per hour a gain of 4.4 percent. The annual average, $1.563 per hour, was 4.5 percent above the 1941 high.

Bricklayers' 1942 hourly rate averaged $1.663; carpenters', $1.404; and structural ironworkers', $1.622. All attained new record levels.

The hourly rate for common labor in manufacturing for 1942 increased 13.5 percent over 1941, and skilled labor was up 14.0 percent, according to the National Industrial Conference Board's annual averages.

Real income, the actual hourly earnings adjusted for changes in living costs, decreased for both skilled and common construction laborers in 1942. Although skilled labor gained 4.4 percent and common rose 8.2 percent, living costs as computed by the N.I.C.B. climbed 9.8 percent, more than offsetting the construction labor rate gains.

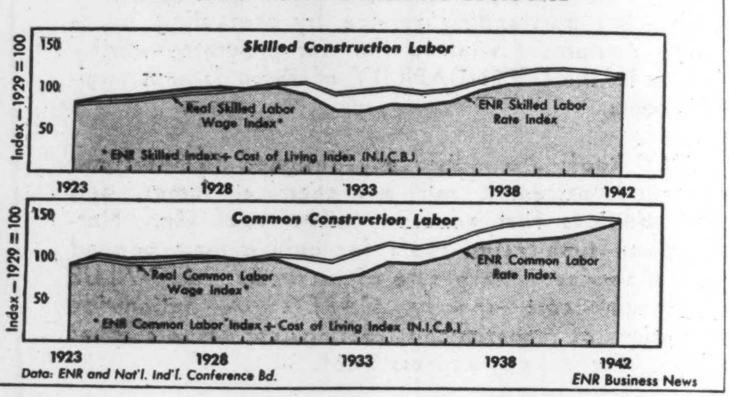
LABOR RATES AT ALL-TIME HIGH



*National Industrial Conference Board

ENR Business News

REAL WAGES DECLINE AS LIVING COSTS RISE



Data: ENR and Nat'l. Ind'l. Conference Bd.

ENR Business News

Construction Wages—Rates per Hour

20-CITIES AVERAGE REPORTED BY ENGINEERING NEWS-RECORD

CONSTRUCTION WAGES

	Skilled Aver.†	Common
1910	$0.525	$0.179
1911	.534	.179
1912	.542	.182
1913	.555	.19
1914	.565	.177
1915	.57	.182
1916	.58	.192
1917	.61	.281
1918	.68	.38
1919	.78	.466
1920	1.05	.579
1921	1.06	.54
1922	1.01	.442
1923	1.10	.518
1924	1.19	.555

Notes:

†*ENR* Skilled Average represents rates for bricklayers, carpenters, ironworkers.

(1) Skilled and Semi-skilled.

(2) Unskilled.

Both represent earnings per hour as reported by N. I. C. B.

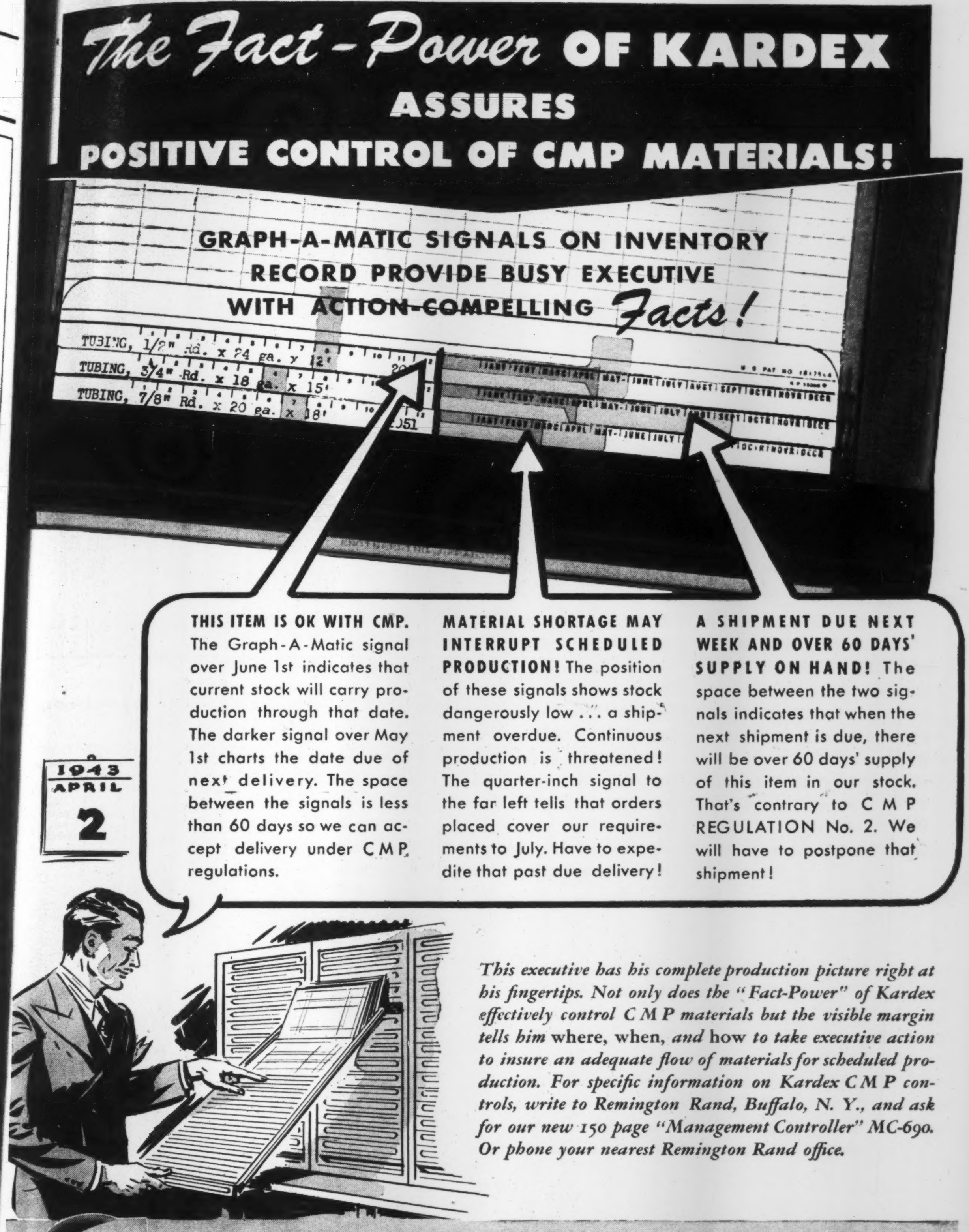
*Checked monthly. Reported in first issue of *ENR* each month.

SKILLED LABOR †*

	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
J	$1.21	$1.24	$1.28	$1.34	$1.35	$1.37	$1.37	$1.15	$0.989	$1.054	$1.108	$1.119	$1.22	$1.39	$1.43	$1.47	$1.47	$1.53	$1.61
F	1.21	1.24	1.32	1.34	1.35	1.38	1.37	1.11	.996	1.062	1.104	1.119	1.24	1.39	1.43	1.47	1.47	1.54	1.61
M	1.21	1.24	1.32	1.34	1.35	1.38	1.36	1.11	.991	1.069	1.092	1.132	1.25	1.40	1.43	1.47	1.47	1.54	1.61
A	1.22	1.25	1.30	1.35	1.35	1.38	1.36	.95	.997	1.084	1.093	1.134	1.26	1.40	1.44	1.47	1.48	1.54	1.61
M	1.22	1.26	1.31	1.36	1.35	1.38	1.36	.96	.998	1.101	1.081	1.138	1.30	1.40	1.44	1.47	1.49	1.54	....
J	1.23	1.27	1.33	1.35	1.36	1.38	1.32	.99	.994	1.101	1.074	1.138	1.33	1.41	1.44	1.47	1.49	1.55	....
J	1.22	1.27	1.33	1.35	1.36	1.38	1.23	1.00	.985	1.104	1.077	1.159	1.35	1.43	1.44	1.48	1.50	1.56	....
A	1.23	1.28	1.34	1.35	1.37	1.39	1.19	.98	.986	1.110	1.088	1.159	1.37	1.43	1.44	1.48	1.50	1.59	....
S	1.23	1.28	1.34	1.35	1.37	1.39	1.19	.99	1.016	1.119	1.088	1.159	1.37	1.43	1.44	1.48	1.52	1.59	....
O	1.23	1.29	1.33	1.35	1.37	1.39	1.17	.98	1.029	1.120	1.104	1.176	1.38	1.43	1.44	1.48	1.52	1.59	....
N	1.23	1.29	1.34	1.35	1.37	1.39	1.16	.97	1.037	1.120	1.101	1.178	1.38	1.43	1.46	1.48	1.52	1.60	....
D	1.24	1.29	1.33	1.35	1.37	1.39	1.15	.98	1.062	1.120	1.101	1.180	1.39	1.43	1.46	1.48	1.52	1.60	....
Aver.	**1.22**	**1.27**	**1.32**	**1.35**	**1.36**	**1.38**	**1.27**	**1.02**	**1.006**	**1.097**	**1.093**	**1.149**	**1.32**	**1.41**	**1.44**	**1.47**	**1.50**	**1.56**	....
Mfg. (1)	.644	.651	.656	.659	.668	.662	.634	.559	.55	.642	.662	.685	.78	.80	.81	.83	.916	1.044	

COMMON LABOR *

	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
J	$0.55¼	$0.54	$0.55¾	$0.55	$0.559	$0.5628	$0.5384	$0.4524	$0.4271	$0.5158	$0.5376	$0.547	$0.603	$0.680	$0.682	$0.685	$0.711	$0.776	$0.832
F	.54	.54	.55¾	.54¾	.564	.5628	.5428	.4521	.4285	.5268	.5241	.547	.603	.675	.680	.685	.713	.780	.832
M	.54¼	.54¼	.56	.54¾	.5509	.5610	.5371	.4358	.4272	.5268	.5243	.547	.612	.675	.680	.685	.716	.780	.842
A	.54¼	.54¼	.56	.55	.529	.5646	.5359	.4122	.4343	.5343	.5255	.552	.612	.677	.683	.685	.725	.788	.858
M	.54	.55	.55½	.55	.5315	.5628	.5394	.4105	.4442	.5343	.5233	.558	.627	.673	.682	.690	.741	.788	....
J	.53	.55	.55½	.55½	.534	.5628	.5394	.4121	.4393	.5343	.5269	.564	.644	.677	.684	.703	.747	.796	....
J	.53	.55¼	.55½	.55¾	.5296	.5615	.4721	.4114	.4430	.5300	.5289	.563	.662	.677	.684	.707	.753	.803	....
A	.53	.55½	.55½	.5607	.5353	.5615	.4634	.4220	.4430	.5300	.5285	.569	.668	.677	.685	.707	.753	.823	....
S	.53	.55⅝	.55⅝	.5607	.5496	.5609	.4665	.4308	.4524	.5349	.5285	.569	.673	.677	.685	.711	.761	.823	....
O	.54	.55	.54½	.5628	.5496	.5596	.4584	.4308	.5057	.5363	.5285	.583	.676	.682	.685	.711	.761	.826	....
N	.54	.55⅝	.54½	.5653	.5603	.5587	.4559	.4260	.5102	.5388	.5275	.583	.678	.682	.685	.711	.768	.832	....
D	.54	.55⅝	.55	.5628	.5653	.5503	.4534	.4273	.5202	.5413	.5275	.586	.678	.682	.685	.711	.769	.832	....
Aver.	**.538**	**.548**	**.554**	**.5558**	**.5465**	**.5607**	**.5002**	**.4269**	**.4562**	**.5319**	**.5276**	**.564**	**.645**	**.678**	**.683**	**.699**	**.743**	**.804**	....
Mfg. (2)	.455	461	.472	.474	.486	.478	.461	.401	.401	.478	.494	.498	.568	.584	.594	.61	.682	.774	....



The Fact-Power OF KARDEX ASSURES POSITIVE CONTROL OF CMP MATERIALS!

GRAPH-A-MATIC SIGNALS ON INVENTORY RECORD PROVIDE BUSY EXECUTIVE WITH ACTION-COMPELLING *Facts!*

TUBING, 1/2" Rd. x 24 ga. x 12'
TUBING, 3/4" Rd. x 18 ga. x 15'
TUBING, 7/8" Rd. x 20 ga. x 18'
1943
APRIL
2

THIS ITEM IS OK WITH CMP. The Graph-A-Matic signal over June 1st indicates that current stock will carry production through that date. The darker signal over May 1st charts the date due of next delivery. The space between the signals is less than 60 days so we can accept delivery under C M P. regulations.

MATERIAL SHORTAGE MAY INTERRUPT SCHEDULED PRODUCTION! The position of these signals shows stock dangerously low . . . a shipment overdue. Continuous production is threatened! The quarter-inch signal to the far left tells that orders placed cover our requirements to July. Have to expedite that past due delivery!

A SHIPMENT DUE NEXT WEEK AND OVER 60 DAYS' SUPPLY ON HAND! The space between the two signals indicates that when the next shipment is due, there will be over 60 days' supply of this item in our stock. That's contrary to C M P REGULATION No. 2. We will have to postpone that shipment!

This executive has his complete production picture right at his fingertips. Not only does the "Fact-Power" of Kardex effectively control C M P materials but the visible margin tells him where, when, *and* how *to take executive action to insure an adequate flow of materials for scheduled production. For specific information on Kardex C M P controls, write to Remington Rand, Buffalo, N. Y., and ask for our new 150 page "Management Controller" MC-690. Or phone your nearest Remington Rand office.*

FACT-POWER . . . . exclusive with Kardex, means vital facts are *signalled* for instant selection, assuring prompt and accurate administrative action.

REMINGTON RAND

Wage Rates per Hour New York City

	Carpenters, 10 Hr. Day	Bricklayers, 8 Hr. Day	Masons' Laborers, 8 Hr. Day	Common Laborers, 10 Hr. Day	Structural Iron-Workers
1874	$0.23	$0.43	$0.18	$0.14	......
1875	.22½	.37	.18	.14	......
1876	.21	.31	.17	.14	......
1877	.20	.31	.15	.12	......
1878	.18	.31	.15	.11	......
1879	.17	.31	.16	.11	......
1880	.18	.34	.18	.12	......
1881	.19	.46	.21	.13	......
1882	.21	.50	.22	.15	......
1883	.21	.50	.23	.13	......
1884	.21	.50	.22	.13	......
1885	.20	.50	.22	.13	......
1886	.21	.50	.23	.13	......
1887	.21	.50	.20	.14	......
1888	.22	.50	.16	.12	......
1889	.22	.50	.23	.13	......
	8 Hr. Day			9 Hr. Day	
1890	.43	.47	.28	.14	......
1891	.43	.47	.28	.14	......
1892	.44	.50	.29	.14	......
1893	.43	.50	.30	.14	......
1894	.44	.50	.30	.14	......
1895	.43	.50	.30	.14	......
1896	.44	.50	.30	.14	......
1897	.44	.50	.29	.14	......
1898	.44	.50	.30	.14	......
1899	.45	.55	.33	.14	......
1900	.50	.56	.33	.14	......
1901	.50	.59	.33	.19	......
1902	.51	.65	.36	.17	......
1903	.56	.65	.36	.16	......
1904	.53	.65	.36	.19	......
1905	.54	.70	.36	.20	......
1906	.58	.70	.38	.21	......
				—8 Hr. Day—	
1907	.62½	.70	.37½	.22	$0.60
1908	.62½	.70	.37½	.22	.60
1909	.62½	.70	.37½	.22	.60
1910	.62½	.70	.37½	.22	.62½
1911	.62½	.70	.37½	.22	.62½
1912	.62½	.70	.37½	.23	.62½
1913	.62½	.70	.37½	.22½	.62½
1914	.62½	.75	.37½	.22½	.62½
1915	.62½	.75	.37½	.25	.62½
1916	.62½	.75	.37½	.25	.66
1917	.69	.75	.42½	.30	.68
1918	.69	.81	.47	.40⅝	.80
1919	.75	.87½	.57½	.40⅝	.87½
1920	1.12½	1.25	.77½	.75	1.12½
1921	1.12½	1.25	.87½	.60	1.12½
1922	1.12½	1.25	.87½	.60	1.12½
1923	1.12½	1.50	.95	.61½	1.12½
1924	1.31¼	1.50	1.00	.68¾	1.29
1925	1.31¼	1.50	1.00	.65⅝	1.46⅞
1926	1.45	1.64⅛	1.07	.81¼	1.60
1927	1.50	1.75	1.12½	.90⅝	1.75
1928	1.50	1.75	1.12½	.90⅝	1.75
1929	1.55	1.84	1.15	.98⅜	1.81
1930	1.65	1.92½	1.03⅛	1.03⅛	1.92½
1931	1.45	1.71⅞	1.02½	.65⅝	1.92½
1932	1.33	1.47	1.00	.64⅛	1.67½
1933	1.37½	1.57½	.91	.72½	1.65
1934	1.40	1.53	.82½	.84⅜	1.62
1935	1.40	1.50	.82½	.68	1.65
1936	1.40	1.50	.82½	.65	1.58
1937	1.60	1.73	.91	.76	1.79
	—7 Hr. Day—				
1938	1.75	1.88½	.99⅜	.91½	1.92⅛
1939	1.75	1.89¼	1.03⅛	.91½	1.92⅛
1940	1.81	1.96	1.03⅛	.91½	1.96½
1941	1.85	2.00	1.03⅛	.93 7/16	2.00
1942	1.85	2.00	1.03⅛	.95	2.00
		1941 by months			
Jan	1.85	2.00	1.03⅛	.87½/.95	2.00
Feb	1.85	2.00	1.03⅛	.87½/.95	2.00
Mar.	1.85	2.00	1.03⅛	.87½/.95	2.00
Apr.	1.85	2.00	1.03⅛	.87½/.95	2.00
May	1.85	2.00	1.03⅛	.87½/.95	2.00
June	1.85	2.00	1.03⅛	.95	2.00
July	1.85	2.00	1.03⅛	.95	2.00
Aug.	1.85	2.00	1.03⅛	.95	2.00
Sept.	1.85	2.00	1.03⅛	.95	2.00
Oct	1.85	2.00	1.03⅛	.95	2.00
Nov.	1.85	2.00	1.03⅛	.95	2.00
Dec.	1.85	2.00	1.03⅛	.95	2.00
		1942 by months			
Jan.	1.85	2.00	1.03⅛	.95	2.00
Feb.	1.85	2.00	1.03⅛	.95	2.00
Mar.	1.85	2.00	1.03⅛	.95	2.00
Apr.	1.85	2.00	1.03⅛	.95	2.00
May	1.85	2.00	1.03⅛	.95	2.00
June	1.85	2.00	1.03⅛	.95	2.00
July	1.85	2.00	1.03⅛	.95	2.00
Aug.	1.85	2.00	1.03⅛	.95	2.00
Sept.	1.85	2.00	1.03⅛	.95	2.00
Oct.	1.85	2.00	1.03⅛	.95	2.00
Nov.	1.85	2.00	1.03⅛	.95	2.00
Dec.	1.85	2.00	1.03⅛	.95	2.00
		1943 by months			
Jan.	1.85	2.00	1.03⅛	.95	2.00
Feb.	1.85	2.00	1.03⅛	.95	2.00
Mar.	1.85	2.00	1.03⅛	.95	2.00
Apr.	1.85	2.00	1.03⅛	.95	2.00

Index of Union Hourly Wage Rates in Building Trades 1929 = 100

Industrial Relations Division
U. S. Department of Labor, Bureau of Labor Statistics

Year	All Building Trades	Journeymen	Helpers & Laborers	Bricklayers	Carpenters	Cement Finishers	Electricians (Inside Wiring)	Glaziers	Lathers	Painters	Plasterers	Plumbers & Gas Fitters	Sheet-Metal Workers	Steam & Sprinkler Fitters	Stonemasons	Structural Ironworkers	Building Laborers	Hod Carriers
1933	86.8	86.9	85.2	85.2	85.2	91.2	89.9	88.0	89.7	87.8	83.7	90.6	89.4	88.2	84.5	91.3	84.2	94.
1934	87.4	87.4	87.7	84.5	86.7	92.1	90.1	93.2	92.1	86.4	84.6	91.4	89.7	89.2	84.4	92.5	87.3	98.
1935	88.4	88.4	88.2	84.2	87.8	92.6	94.4	94.1	93.1	86.7	85.6	92.8	90.4	90.7	84.2	93.2	88.6	87.
1936	91.6	91.3	93.4	84.7	92.3	95.0	96.9	95.5	95.5	91.1	86.1	95.2	92.2	93.7	85.2	95.6	96.2	92.
1937	98.0	97.6	101.5	90.6	98.3	101.9	101.1	104.6	101.8	97.7	94.9	100.4	98.9	98.8	94.1	104.4	105.3	99.
1938	106.7	106.1	111.7	100.1	107.1	111.3	111.4	112.2	112.7	104.2	106.1	112.5	108.8	111.4	102.1	112.7	112.9	109.
1939	107.4	106.8	112.6	100.6	107.3	111.7	112.0	113.0	116.4	105.0	107.0	113.5	110.4	112.2	102.4	114.0	113.6	109.
1940	109.1	108.3	114.8	102.8	110.0	112.7	113.9	114.3	117.2	105.2	107.5	115.3	112.4	112.5	101.9	114.4	115.4	113.
1941	113.1	112.1	120.3	105.2	112.5	116.7	119.1	117.9	121.6	112.2	109.4	120.3	117.6	116.0	104.5	119.9	122.2	117.
1942	120.2	118.4	132.3	109.0	120.3	123.8	127.1	122.9	127.0	116.0	112.4	125.4	128.1	122.6	110.6	123.9	135.9	128.

Index of Weekly Hours in Union Building Trades 1929 = 100

Year	All Building Trades	Journeymen	Helpers & Laborers	Bricklayers	Carpenters	Cement Finishers	Electricians (Inside Wiring)	Glaziers	Lathers	Painters	Plasterers	Plumbers & Gas Fitters	Sheet-Metal Workers	Steam & Sprinkler Fitters	Stonemasons	Structural Ironworkers	Building Laborers	Hod Carriers
1933	94.0	93.8	94.4	94.9	91.6	95.7	94.3	92.9	92.9	97.7	97.2	93.3	93.2	93.1	93.8	93.1	93.2	96.1
1934	90.5	90.3	91.4	93.3	90.8	92.2	88.7	88.1	87.5	85.6	93.1	92.4	91.9	92.5	93.4	91.8	89.1	94.3
1935	89.8	89.6	90.8	93.2	90.4	92.0	85.1	87.5	87.4	85.5	91.6	91.8	92.0	92.2	93.3	90.7	89.0	94.2
1936	89.8	89.6	91.0	93.2	90.5	91.6	85.4	87.8	86.5	85.9	90.1	90.6	91.9	92.4	93.3	90.6	89.5	94.0
1937	90.2	90.0	91.3	94.1	90.3	91.7	89.6	87.9	87.7	85.9	90.2	91.1	92.0	92.5	93.3	90.2	89.7	94.3
1938	88.7	88.4	89.9	91.0	88.6	88.9	89.1	86.3	86.1	86.0	86.5	86.5	90.1	87.6	90.2	89.2	89.3	93.2
1939	88.5	88.3	89.7	91.1	88.6	88.9	88.8	86.1	85.4	85.7	86.5	86.8	90.1	88.0	90.2	89.1	89.2	92.9
1940	88.4	88.3	89.2	90.8	88.6	89.1	88.8	86.1	85.2	86.1	86.3	85.9	90.1	88.0	90.1	89.1	88.7	92.8
1941	88.8	88.7	89.4	91.0	89.1	89.5	89.3	86.6	86.0	86.3	86.6	86.3	90.8	88.5	90.2	89.5	88.9	92.7
1942	89.5	89.9	88.6	91.8	89.3	89.4	92.9	87.8	87.5	91.3	88.2	86.7	90.9	89.9	90.4	90.1	88.1	91.6

Overtime Rates Provided in Building-Trades Union Agreements, July 1, 1942

Trade	Number of quotations showing initial overtime rates of—			Number of quotations showing Sunday rates of—		
	Time and a half	Double time	No penalty rate specified	Time and a half	Double time	No penalty rate specified
All building trades	1,506	1,439	12	597	2,351	9
Journeymen	1,077	1,174	10	471	1,783	7
Asbestos workers	33	37	....	26	44	....
Boilermakers	8	42	....	5	44	1
Bricklayers	25	67	....	7	85	....
Carpenters	58	72	2	18	114	....
Cement finishers	59	28	....	23	64	....
Electricians, inside wiremen	56	42	....	38	60	....
Elevator constructors	28	105	....	5	128	....
Glaziers	60	16	....	30	46	....
Granite cutters	15	12	....	5	22	....
Lathers	17	67	1	5	80	....
Machinists	19	15	....	8	26	....
Marble setters	20	46	....	6	60	....
Mosaic and terrazzo workers	34	29	....	6	56	1
Painters	148	35	1	91	93	....
Paperhangers	65	15	1	35	46	....
Plasterers	32	56	....	15	73	....
Plumbers and gas fitters	34	56	....	16	74	....
Rodmen	4	67	....	4	67	....
Roofers, composition	95	20	....	36	79	....
Roofers, slate and tile	50	19	....	21	48	....
Sheet-metal workers	18	53	....	12	59	....
Sign painters	62	12	....	23	51	....
Steam and sprinkler fitters	38	73	....	19	92	....
Stonecutters	36	19	5	6	49	5
Stonemasons	22	52	....	2	72	....
Structural-iron workers	2	79	....	2	79	....
Tile layers	39	40	....	7	72	....
Helpers and laborers	429	265	2	126	568	2
Bricklayers' tenders	83	27	....	31	79	....
Building laborers	78	17	....	29	66	....
Composition roofers' helpers	31	5	....	12	23	1
Elevator constructors' helpers	20	81	....	....	101	....
Marble setters' helpers	27	19	....	3	43	....
Plasterers' laborers	57	29	1	18	69	....
Plumbers' laborers	28	15	....	13	30	....
Steam and sprinkler fitters' helpers	11	38	....	3	46	....
Terrazzo workers' helpers	57	15	....	10	62	....
Tile layers' helpers	37	19	1	7	49	1

OTECTING THE HEADS
OF OUR VITAL WAR WORKERS

IN SHIPYARDS . . . BRIDGE AND STEEL ERECTION . . . BUILDING CONSTRUCTION . . . TUNNELING . . . QUARRYING . . . LUMBERING . . . MINING . . . STEEL MILLS . . . CHEMICAL PLANTS and many special fields.

M·S·A Skullgards

For outstanding production achievement . . . the Maritime "M" Pennant and Victory Fleet Flag, awarded to M.S.A. by the U. S. Maritime Commission.

Peacetime's most popular work hat is doing a *bigger* job in war—answering the call for proved head protection in every stepped-up industry where head hazards threaten—saving priceless man-hours for higher war production. M.S.A. Skullgards interpose the strength of laminated bakelite between danger and the worker's head—do not soften or deteriorate from exposure to water, oil, heat or ordinary chemicals, and are non-conductive to electricity. See for yourself their light-weight *comfort*—write for a demonstration!

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS · PITTSBURGH, PA.
District Representatives in Principal Cities

Building Trades Wage Rates Prevailing March 1, 1943

Compiled by Engineering News-Record

City and State	Carpenters	Bricklayers	Structural Ironworkers	Common Labor—Buildings	Common Labor—Hvy. Constr.	Stone Masons	Mason's Helpers	Plasterers	Mosaic and Terrazzo	Tile Layers	Cement Finishers	Lathers	Electric Workers (Inside)	Painters	Glaziers	Plumbers	Steamfitters	Roofers	Waterproofers	Sheet Metal Workers	Welders	Hoisting Engr.—1-Drum	Hoisting Engr.—2-Drum	Tractor Operator (Over 30-hp.)	Power Shovel Operator	Truck Drivers
Albany, N. Y.	$1.58	$1.58	$1.58	$0.85	$0.85	$1.58	$0.85	$1.58	$1.38	$1.38	$1.58	$1.66	$1.63	$1.30	$1.20	$1.50	$1.50	[4]$1.44	[4]$1.44	[4]$1.44	$1.58	$1.75	$2.00	$1.50	$2.00	$0.
Albuquerque, N. M.	1.25	1.50	1.50	.60	.85	1.50	.85	1.50	1.25	1.25	1.25	1.25	1.50	1.00	1.25	1.50	1.50	1.25	1.00	1.25	1.50	1.25	1.25	1.25	1.50	.9
Anderson, Ind.	1.25	1.64	1.65	.80	.80	1.64	1.00	1.63	1.25	1.25	1.38	1.63	1.25	1.25	1.25	1.50	1.50	1.00	.....	1.00	.....	1.60	1.60	1.60	1.60	[illegible]
Atlanta, Ga.	1.25	1.50	1.38	.40	.50	.....	.....	1.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.25	.....	.....	.....	.....
Austin, Tex.	1.25	1.65	1.50	.50	.50	1.50	.65	1.75	1.50	1.50	1.50	1.50	1.50	1.13	1.13	1.50	1.50	1.00	.....	1.50	1.50	1.25	1.50	1.25	1.38	.7
Baltimore, Md.	1.38	1.75	1.80	.70	.70	1.75	.95	1.50	1.50	1.50	1.50	1.50	1.65	1.25	1.25	1.65	1.65	1.38	1.38	1.50	1.80	1.63	2.00	1.13	2.00	.7
Baton Rouge, La.	1.25	1.63	1.50	.70	.85	1.63	.70	1.50	.....	1.63	1.50	1.50	1.50	1.38	1.50	1.38	1.50	.....	1.00	1.25	1.50	1.25	1.50	1.25	1.50	1.0
Birmingham, Ala.	1.25	1.75	1.50	.65	.55	1.75	.65	1.50	1.75	1.75	1.50	1.25	1.65	1.38	1.38	1.75	1.75	1.40	1.40	1.40	†	1.25	1.50	1.25	1.50	.7
Bismarck, N. D.	1.00	1.40	1.25	.55	.55	1.40	.55	1.25	.....	1.40	1.25	1.00	1.00	.85	.85	1.00	1.00	.....	.90	.90	1.00	.90	1.00	.70	.90	.7
Boise, Idaho	1.25	1.50	1.50	.75	.75	.....	1.00	1.50	.....	.....	1.25	1.38	1.50	1.13	1.13	1.50	1.50	1.25	.....	1.25	†	.....	.....	1.45	1.75	.8
Boston, Mass.	1.50	1.63	1.65	1.00	1.00	1.63	1.00	1.67	1.63	1.63	1.63	1.67	1.65	1.38	1.50	1.65	1.65	1.50	1.63	1.65	†	1.88	.....	.....	1.88	.9
Buffalo, N. Y.	1.50	1.75	1.75	.85	.....	1.75	.....	1.75	.....	1.38	1.50	1.75	1.75	1.75	.....	1.75	1.75	1.60	.....	1.75	1.75	1.75	1.75	1.75	1.75	1.0
Burlington, Vt.	1.00	1.50	1.50	.60	.75	1.50	.75	1.50	1.50	1.50	1.25	1.68	.75	.80	.80	.88	.88	1.25	1.25	1.50	1.50	1.55	1.70	1.00	1.25	.65
Charleston, S. C.	1.13	1.50	1.50	.40	.40	1.50	.50	1.25	1.25	1.25	1.00	1.25	1.50	1.00	.85	1.75	1.75	1.00	1.00	1.00	†	1.00	1.25	1.00	1.50	.60
Charleston, W. Va.	1.50	1.75	1.63	.75	.75	1.75	.75	1.63	1.50	1.50	1.25	1.50	1.75	1.50	1.25	1.63	1.63	1.25	1.25	1.25	1.25	1.50	1.63	1.50	1.63	1.25
Cheyenne, Wyo.	1.25	[1]1.63	1.38	.65	.65	1.63	1.00	1.50	1.50	1.63	[1]1.25	1.50	[1]1.25	1.25	1.25	[1]1.38	1.38	1.25	1.25	1.38	1.38	1.00	1.25	1.25	1.50	1.00
Chicago, Ill.	1.70	1.75	1.76	1.10	1.10	1.75	1.10	1.83	1.70	1.70	1.70	1.83	1.70	1.73	1.88	1.70	1.70	1.75	1.75	1.75	1.25	1.75	2.00	1.45	2.00	.90
Cincinnati, Ohio	1.50	1.75	1.68	.85	.85	1.75	.85	1.63	1.50	1.50	1.45	1.63	1.65	1.50	1.70	1.65	1.65	1.50	1.50	1.55	†	1.45	1.60	1.10	1.60	.90
Cleveland, Ohio	1.50	1.75	1.75	1.00	1.00	1.75	1.00	1.75	1.50	1.63	1.50	1.75	1.75	1.52	1.63	1.63	1.63	1.63	1.63	1.62	1.50	1.50	1.63	1.30	1.88	1.02
Columbia, S. C.	1.00	1.25	1.25	.40	.40	1.00	.40	1.00	1.00	1.00	1.25	1.25	1.25	1.00	1.00	1.50	1.50	1.00	1.25	1.00	1.00	1.00	1.00	1.00	1.25	.50
Columbus, Ohio	1.38	1.75	1.63	.75	.75	1.75	.95	1.55	1.25	1.25	1.38	1.55	1.50	1.38	1.25	1.50	1.50	1.38	1.38	1.50	1.75	1.38	1.50	1.15	1.63	.75
Conway, Ark.	.75	1.63	.....	.40	.45	1.63	.45	1.25	.....	1.50	1.25	1.25	1.50	1.25	1.00	1.50	1.50	.75	1.25	1.25	.....	.....	.....	.....	.....	.....
Dallas, Tex.	1.25	1.63	1.63	.63	.50	1.63	.75	1.63	1.50	1.50	1.38	1.50	1.63	1.25	.....	1.63	1.63	1.13	1.38	1.50	1.63	1.25	1.38	1.25	1.38	.65
Detroit, Mich.	1.50	1.68	1.75	.90	.90	1.68	.90	1.68	1.50	1.68	1.50	1.68	1.85	1.50	1.40	1.75	1.75	1.95	1.50	1.50	1.75	1.63	1.75	1.75	1.75	1.00
Fort Worth, Tex.	1.25	1.63	1.50	.60	.65	1.63	.75	1.63	1.63	1.38	1.38	1.50	1.50	1.25	1.25	1.63	1.63	1.00	1.00	1.50	1.63	1.25	1.38	1.25	1.38	.75
Denver, Colo.	1.50	1.65	1.63	.80	.80	.....	.....	1.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.43	.....	.....	.....	.....
Duluth, Minn.	1.28	1.38	1.50	.78	.88	1.38	.78	1.35	1.38	1.38	1.00	1.35	1.40	1.13	.95	1.38	1.38	1.20	1.20	1.30	1.50	1.50	1.50	1.00	1.63	.95
Frankfort, Ky.	1.10	1.50	.....	.80	.80	.....	.....	.....	.....	.....	.....	.....	.....	.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg, Pa.	1.50	1.63	1.75	.70	1.00	1.63	1.00	1.50	1.50	1.40	1.50	1.38	1.50	1.25	1.25	[2]1.40	1.40	[2]1.00	1.00	1.25	1.25	1.65	1.65	1.65	1.80	.70
Helena, Mont.	1.25	1.50	1.50	.90	.90	1.50	1.13	1.50	1.50	1.50	1.50	1.50	1.50	1.25	1.50	1.50	1.50	1.25	1.25	1.25	†	1.50	1.50	1.50	1.50	.95
Indianapolis, Ind.	1.43	1.68	1.65	.83	.83	1.68	1.10	1.63	1.38	1.50	1.38	1.50	1.63	1.43	1.43	1.63	1.63	1.33	1.25	1.47	1.63	1.30	1.60	1.00	1.50	.85
Jackson, Miss.	1.25	1.50	2.00	.55	.55	1.50	.55	1.50	1.25	1.25	1.50	1.25	1.38	1.13	1.00	1.50	1.50	1.25	.....	1.25	1.25	1.13	1.38	1.25	1.38	.60
Jacksonville, Fla.	1.13	1.50	1.38	.50	.60	1.50	.65	1.50	1.50	1.50	1.00	1.50	1.50	1.25	1.00	1.50	1.50	1.13	1.13	1.25	1.20	1.38	1.50	1.25	1.50	.75
Jefferson City, Mo.	1.13	1.50	1.75	.65	.65	.....	.88	2.00	.....	.....	1.50	1.13	.....	1.00	1.50	1.50	1.50	1.00	.....	1.25	1.00	2.00	2.00	1.50	2.00	.95
Kansas City, Mo.	1.50	1.65	1.63	.90	1.15	1.65	.95	1.65	1.45	1.45	1.50	1.58	1.65	1.38	1.56	1.65	1.65	1.38	1.38	1.63	1.63	1.50	1.63	1.38	1.50	.83
Lansing, Mich.	1.50	1.68	1.75	.90	.90	1.68	1.13	1.68	1.50	1.50	1.50	1.68	1.85	1.50	1.40	1.75	1.75	1.55	.....	1.50	.....	1.63	1.63	1.63	1.63	.90
Lexington, Ky.	1.25	1.50	1.50	.75	.90	1.68	.90	1.25	1.50	1.38	1.38	1.25	1.50	1.10	1.20	1.63	1.63	1.05	1.05	1.05	1.50	1.50	1.25	1.00	.....	.90
Louisville, Ky.	1.43	1.68	1.38	.70	.80	1.50	1.00	1.63	.....	1.68	1.43	1.63	1.63	1.25	1.25	1.63	1.63	1.10	1.10	1.43	†	1.50	1.50	1.25	1.50	1.00
Los Angeles, Calif.	1.35	1.50	1.63	.88	.88	1.50	1.13	1.67	1.38	1.38	1.50	1.50	1.70	1.25	1.25	1.50	1.75	1.25	1.38	1.50	†	1.38	1.38	1.50	1.75	.95
Meridian, Miss.	1.25	1.50	2.00	.55	.55	1.50	.55	1.50	1.25	1.25	1.50	1.25	1.38	1.13	1.00	1.50	1.50	1.25	.....	1.25	1.25	1.13	1.38	1.25	1.38	.60
Memphis, Tenn.	1.25	1.63	1.50	.45	.45	1.63	.75	1.56	1.63	1.63	1.25	1.56	1.50	1.38	1.13	1.50	1.50	1.25	.75	1.38	†	1.25	1.50	1.25	1.50	.85
Milwaukee, Wis.	1.43	1.60	1.50	1.00	1.00	1.60	1.10	1.50	1.40	1.50	1.40	1.50	1.50	1.25	1.40	1.55	1.55	1.50	1.35	1.40	1.50	1.45	1.45	1.40	1.75	.90
Minneapolis, Minn.	1.38	1.50	1.50	.93	.93	1.50	1.03	1.50	1.30	1.38	1.38	1.50	1.50	1.35	1.25	1.50	1.50	1.30	1.30	1.50	1.50	1.50	1.50	1.50	1.63	.95
Mobile, Ala.	1.38	1.63	1.50	.65	.75	1.63	.75	1.38	1.38	1.63	1.38	1.50	1.50	1.38	1.25	1.75	1.75	1.38	.....	1.25	.....	1.25	1.50	1.25	1.50	1.00
Nashville, Tenn.	1.25	1.63	1.25	.45	.55	1.63	.55	1.50	1.25	1.25	1.25	1.50	1.50	1.13	1.13	1.50	1.50	1.13	1.00	1.25	†	1.00	1.25	1.00	1.50	.75
Newark, N. J.	2.00	2.00	2.00	1.20	1.20	2.00	.....	2.00	1.75	1.75	2.00	2.00	2.00	1.85	1.65	2.00	1.75	1.85	1.85	1.75	2.00	2.03	2.03	2.03	2.03	1.00
New Orleans, La.	1.25	1.50	1.50	.65	.75	1.50	.75	1.38	1.50	1.50	1.25	1.50	1.50	1.13	1.31	1.50	1.50	1.13	1.13	1.25	1.50	1.25	1.50	1.50	1.50	.70
New York, N. Y.	1.85	2.00	2.00	1.03	.95	1.90	1.21	2.00	1.75	1.75	1.85	1.85	2.00	1.75	1.89	2.00	2.00	2.00	1.70	2.00	†	1.75	2.03	1.38	2.25	1.06
Ogden, Utah	1.13	1.63	1.50	.80	.75	1.38	.90	1.50	1.25	1.25	1.25	1.30	1.50	1.50	1.13	1.50	1.63	1.25	1.10	1.25	1.63	1.25	1.50	1.38	1.63	.75
Oklahoma City, Okla.	1.38	1.63	1.38	.65	.65	1.50	.75	1.50	1.50	1.50	1.50	1.50	1.63	1.25	1.50	1.63	1.63	1.00	1.00	1.50	1.38	1.25	1.50	1.25	1.38	.75
Omaha, Neb.	1.38	1.58	1.38	.70	.80	1.58	.70	1.50	1.38	1.38	1.38	1.50	1.50	1.20	1.20	1.50	1.50	1.10	1.10	1.25	1.50	1.25	1.35	1.11	1.25	.70
Philadelphia, Pa.	1.50	1.90	1.90	.83	.83	1.50	.83	2.00	1.50	1.50	1.50	1.75	1.88	1.50	1.55	1.75	1.75	1.75	1.40	1.70	.....	1.90	.....	1.78	2.05	.90
Pittsburgh, Pa.	1.75	1.96	1.75	.90	.80	1.63	1.25	1.88	1.50	1.57	1.75	1.88	1.75	1.50	1.55	1.75	1.75	1.65	1.63	1.63	1.75	1.75	1.81	1.50	1.81	1.00
Raleigh, N. C.	.90	1.50	1.25	.40	.50	1.50	.45	1.50	1.25	1.25	1.00	1.10	1.25	1.00	.90	1.50	1.50	.90	.90	1.00	1.00	1.00	1.25	1.00	1.25	.40
Reno, Nev.	1.50	2.00	1.75	.75	.90	1.75	1.00	1.75	.....	.....	1.25	1.75	1.50	1.50	1.50	1.63	1.63	1.38	.....	1.50	.....	.....	.....	1.50	1.75	.90
St. Louis, Mo.	1.50	1.75	1.75	.95	1.00	1.50	1.00	1.75	1.50	1.50	1.58	1.75	1.75	1.50	1.63	1.63	1.63	1.50	1.50	1.63	1.50	1.50	2.00	2.00	2.00	1.00
St. Paul, Minn.	1.38	1.50	1.50	.93	.93	1.50	.93	1.50	1.30	1.38	1.38	1.50	1.50	1.35	1.25	1.50	1.50	1.30	1.30	1.50	1.50	1.50	1.50	1.50	1.63	.95
Salt Lake City, Utah	1.13	1.50	1.50	.75	.75	1.38	.90	1.50	1.25	1.25	1.25	1.50	1.50	1.25	1.13	1.50	1.50	1.25	.....	1.25	1.63	1.25	1.50	1.38	1.63	.75
San Antonio, Tex.	1.25	1.65	1.50	.50	.50	1.65	.50	1.50	1.50	1.50	1.50	1.50	1.50	1.13	1.13	1.63	1.63	1.25	.....	1.50	1.63	1.25	1.50	1.25	1.50	.50
San Diego, Calif.	1.35	1.50	1.63	.88	.88	1.50	1.13	1.63	1.38	1.38	1.50	1.63	1.70	1.25	1.20	1.50	1.50	1.25	1.38	1.38	†	1.38	1.38	1.50	1.75	.95
San Francisco, Calif.	[3]1.44	1.88	1.75	.95	.95	1.88	1.40	1.75	1.25	1.50	1.50	1.75	1.70	1.50	1.30	1.70	1.70	1.50	1.50	1.50	†	1.50	1.50	1.63	2.00	.97
Santa Fe, N. Mex.	1.25	1.50	1.50	.60	.75	1.50	.85	1.50	1.25	1.25	1.25	1.25	1.50	1.00	1.25	1.50	1.50	1.25	1.00	1.25	1.50	1.25	1.25	1.25	1.50	.75
Seattle, Wash.	1.48	1.78	1.68	1.08	1.10	1.78	1.33	1.78	1.53	1.53	1.48	1.68	1.68	1.48	1.43	1.68	1.68	1.48	.....	1.63	1.25	1.70	1.70	1.70	2.00	1.35
Springfield, Ill.	1.50	1.75	1.75	1.00	1.00	1.75	1.15	1.75	1.35	1.35	1.50	1.63	1.60	1.50	1.50	1.70	1.70	1.40	1.40	1.50	1.75	1.35	1.75	1.50	1.50	1.00
Syracuse, N. Y.	1.38	1.63	1.63	.81	.....	.....	.....	1.63	1.63	.....	1.38	1.63	1.65	.....	1.25	1.68	1.65	1.40	.....	1.40	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	1.45	1.70	1.65	1.10	.....	.....	.....	1.65	1.45	1.45	1.50	1.60	1.65	1.40	1.25	1.65	1.65	1.35	1.10	1.50	1.25	1.75	2.00	1.75	2.00	1.55
Topeka, Kan.	1.13	1.50	1.62	.60	.60	1.38	.75	1.50	1.38	1.38	1.38	1.38	1.38	1.13	1.57	1.50	1.50	1.25	1.25	1.50	1.50	1.38	1.50	1.00	1.50	.75
Trenton, N. J.	1.63	1.78	2.00	.90	.90	1.78	.90	1.78	1.78	1.78	1.78	.90	2.00	1.50	1.50	1.75	1.75	1.60	1.60	1.75	†	2.00	2.00	.....	.....	.88
Tulsa, Okla.	1.25	1.63	1.38	.65	.65	1.63	.80	1.63	1.63	1.63	1.50	1.50	1.50	1.25	1.25	1.00	1.50	1.00	1.00	1.38	†	1.25	1.25	1.00	1.25	.75
Washington, D. C.	1.63	1.75	2.00	.88	.88	1.75	1.00	2.00	1.65	1.63	1.50	1.75	2.00	2.00	1.65	1.75	1.75	1.75	.....	1.75	†	1.75	2.00	1.25	2.00	.90
Wheeling, W. Va.	1.50	1.75	1.63	.75	.75	1.75	.75	1.63	1.50	1.50	1.25	1.50	1.75	1.50	1.25	1.63	1.63	1.25	1.25	1.25	1.25	1.50	1.63	1.50	1.63	1.25
Wilmington, Del.	1.38	1.83	1.90	.75	.75	1.50	.....	1.50	1.38	1.40	1.50	1.50	.....	1.33	1.55	1.60	1.60	1.50	1.20	1.75	†	.....	.....	.....	.....	.76

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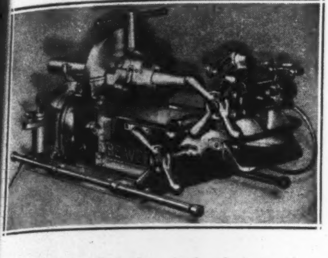
† Rate same as trade in connection with which they work. [1] Rate increase being considered: may rise by May 1. [2] Seeking higher rates. [3] Increase approved, but decision appealed; still paying this rate. [4] Seeking increase to $1.50 per hour.

BEAVER PIPE TOOLS

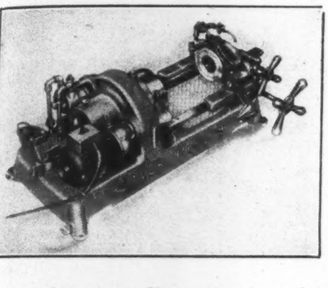
Highest Quality ★ WARREN, OHIO ★ *For 44 Years*

The A-B-C of Pipe and Bolt Machines



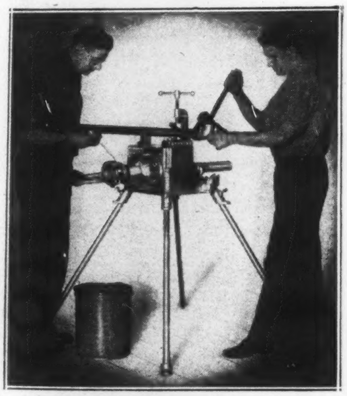
BEVER MODEL — A

A high-speed heavy-duty deluxe pipe and bolt machine, complete in every detail and admitted leader in its field. Will cut, thread and ream ⅛ to 2-inch pipe and, with drive shaft and geared tools, will cut and thread 2½ to 12-inch pipe. Threads bolts ¼ to 2-inch; cuts off bolts (wheel cutter) up to ⅞-inch. New high speed model outperforms all competition. Right-handed—like a lathe. More than 50% greater open working space. All controls in front. Wheel or knife cutoff. Standard geared chuck with automatic safety wrench ejector. Safety shear pin. Ring-type opening adjustable dieheads—no hinge. Die segments adjust simultaneously as a unit. Choice of 110 or 220 volt universal reversible motor. Automatic gear-driven oil pump. Weight about 415 lbs.



BEAVER MODEL — B

A highly efficient low-priced portable Utility Machine embodying many advanced features heretofore available only on higher priced machines. Complete range ½ to 8-inch pipe; ¼ to 1½-inch bolts. Rack-and-pinion feed; 60% more power; one-piece cast steel-iron base and cap—no flimsy sheet metal housings; sockets for pipe legs to form inexpensive but sturdy stand; all gears run in oil; all-steel geared universal ⅛ to 2-inch chuck—with safety automatic chuck wrench ejector; hinged full-range reamer; sliding wheel or knife cutoff; ring-type opening adjustable dieheads—no hinge. Automatic gear-driven oil pump or one-gallon oil reservoir option. Adequate motor ventilation. Choice of 110 or 220 volt universal reversible motor. Weight approximately 280 lbs



BEAVER MODEL — C

Converts pipe tools into electric power Tools. It will cut, thread and ream ⅛ to 2-inch pipe. With driveshaft and geared tools 2½ to 8-inch pipe may be cut and threaded. Bolts up to 1½-inch size. Has ample power to allow for dull dies and low line voltage. Choice of 110 or 220 volt universal reversible motor. Now equipped with automatic chuck wrench ejector and safety lath—to protect machine and workman. Equipped with legs, vise and bender, the Beaver Model-C becomes a complete portable electric pipe shop. Hundreds of users, in all parts of the world, say the Beaver Model-C is "the best investment we ever made."

A COMPLETE LINE OF HAND TOOLS

UNIT TYPE RATCHET THREADERS

No. 2 Beaver (Open Ratchet Teeth) Complete

⅛ to ¾"	$14.00	⅜ to ¾"	$9.20
¼ to ¾"	11.60	½ to ¾"	6.80
Carrying case for Nos. 2 or 3 Ratchets			1.50

No. 3 Beaver (Enclosed Ratchet Teeth) Complete

⅛ to 1"	$18.00	⅜ to 1"	$13.00
¼ to 1"	15.50	¼ to ¾"	13.00
Carrying case for Nos. 2 or 3 Ratchets			1.50

No. 17 Beaver Ratchet Threader Complete

½ to 1¼"	$13.50	½ to 2"	$21.00
1¼ to 2"	12.75	⅛ to 2"	29.25

"3-Way" Threaders

No. 33 Beaver ⅜ to ¾"	$7.50
No. 34 Beaver ½ to 1"	8.00
No. 34-E Beaver ½ to 1" Conduit	8.00

FULLY ADJUSTABLE PIPE and BOLT THREADERS

Threads ⅛ to ¾" pipe; ¼ to 1" bolts

No. 71 Plain—less dies	$4.50
No. 71R Ratchet—less dies	6.50
Pipe or bolt dies, any size, per set RH	1.50
Pipe or bolt dies, any size, per set LH	2.50
Metal Carrying Case	2.50

FULLY ADJUSTABLE SELF-CONTAINED THREADERS TO 2"

No. 6 Beaverette Plain—¼ to ¾"	$12.00
No. 6R Beaverette Ratchet—¼ to ¾"	15.00
No. 10R Ratchet—1 to 2"	13.50
No. 25 Beaver Plain DeLuxe—1 to 2"	16.50
No. 26 Beaver Ratchet DeLuxe—1 to 2"	19.25

SEMI-ADJUSTABLE TAPER-POST THREADERS 1 to 2"

No. 7R Beaver Ratchet with Bushings	$13.50
No. 9 Beaver Plain DeLuxe (Universal Chuck)	12.00
No. 9R Beaver Ratchet DeLuxe (Universal Chuck)	15.00
No. 38RS—(8thd) 2½ & 3"	27.00

LARGE GEARED ADJUSTABLE THREADERS

No. 41E—2½ to 4"	$ 55.00	No. 61-E—2½ to 6"	$115.00
No. 61-EX—4 to 6"	100.00	No. 80-E—4½ to 8"	150.00
No. 90—9 to 12"	$250.00		

GEARED SEMI-ADJUSTABLE THREADERS

No. 48R—2½ to 4"	$55.00

WHEEL CUTTERS

No. 102—⅛ to 2" (1 wheel)	$4.40
No. 102—⅛ to 2" (3 wheel)	4.80
No. 204—2½ to 4" (3 wheel only)	14.40

SQUARE END KNIFE CUTTERS ⅛ to 12"

For Cutting—Beveling—or Grooving

No. 1—⅛ to 1"	$13.50	No. 10—2½ to 4" Ratchet	$60.00
No. 5—½ to 2"	15.00	No. 15—2½ to 6" Ratchet	75.00

Geared Type Hand or Power (Ratchet)

No. 104—2½ to 4"	$ 75.00	No. 108—4½ to 8"	$150.00
No. 106—2½ to 6"	120.00	No. 112—9 to 12"	200.00

BEAVER ALLOY STEEL DROP FORGED REAMERS

No. 200 Swivel—⅛ to 2"	$5.00
No. 200R Ratchet—⅛ to 2"	6.00
No. 300R Ratchet—⅜ to 3"	7.00

BEAVER SQUARE-END SAWING VISE

No. 2—⅛ to 2"	$6.50	No. 4—1½ to 4"	$15.00

Write for Catalog 44EN

Yearly Average WAGES OF SIX BUILDING TRADES in Seven Cities

Bricklayers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.65	$0.70	$0.75	$0.70	$0.70	$0.875	$0.75
1914	.65	.75	.75	.70	.75	.875	.75
1915	.65	.75	.75	.70	.75	.875	.75
1916	.65	.75	.75	.70	.75	.875	.75
1917	.70	.75	.75	.70	.75	.875	.81
1918	.80	.81	.75	.875	.85	1.00	1.00
1919	.80	.875	.875	.875	1.00	1.125	1.125
1920	1.00	1.25	1.25	1.00	1.25	1.25	1.25
1921	1.00	1.25	1.25	1.00	1.25	1.25	1.125
1922	1.00	1.25	1.10	1.00	1.25	1.25	1.125
1923	1.25	1.50	1.10	1.125	1.50	1.375	1.25
1924	1.25	1.50	1.35	1.125	1.75	1.25	1.25
1925	1.25	1.50	1.50	1.25	1.75	1.25	1.35
1926	1.35	1.645	1.56	1.25	1.75	1.25	1.375
1927	1.40	1.75	1.625	1.25	1.75	1.375	1.375
1928	1.42	1.75	1.625	1.45	1.75	1.375	1.4275
1929	1.50	1.84	1.65	1.50	1.75	1.375	1.50
1930	1.50	1.925	1.70	1.50	1.75	1.375	1.50
1931	1.50	1.7125	1.70	.8125	1.75	1.375	1.1875
1932	1.105	1.47	1.40	.825	1.50	1.175	.975
1933	1.10	1.575	1.406	.812	1.50	1.125	1.01
1934	1.12	1.53	1.50	1.00	1.50	1.50	1.30
1935	1.20	1.50	1.50	1.00	1.50	1.50	1.00
1936	1.28	1.50	1.50	1.00	1.50	1.50	1.00
1937	1.50	1.725	1.62	1.33	1.50	1.60	1.54
1938	1.50	1.886	1.70	1.50	1.50	1.75	1.60
1939	1.50	1.893	1.70	1.50	1.50	1.75	1.60
1940	1.50	1.96	1.70	1.49	1.50	1.75	1.60
1941	1.50	2.00	1.70	1.448	1.396	1.75	1.6375
1942	1.573	2.00	1.721	1.75	1.563	1.771	1.715

Hodcarriers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.35	$0.375	$0.40	....	$0.4875	$0.50	
1914	.35	.375	.40	....	.4875	.50	....
1915	.35	.375	.40	....	.4875	.50	....
1916	.35	.375	.425	....	.4875	.50	....
1917	.40	.425	.45	....	.4875	.50	....
1918	.425	47	.50	....	.51	.625	....
1919	.50	.575	.575	....	.6375	.75	....
1920	.70	.775	1.00	....	.70	.93	....
1921	.70	.875	1.00	....	.85	1.00	$0.875
1922	.70	.875	.725	....	.85	.71	.875
1923	.70	.95	.725	....	1.00	.77	.93
1924	.82	1.00	.725	$0.385	1.20	.8125	.95
1925	.7625	1.00	.825	.6075	1.20	.8125	1.00
1926	.77	1.07	.88	.625	1.20	.8125	1.00
1927	.79	1.125	.925	.625	1.20	.875	1.00
1928	.805	1.125	.93125	.52	1.20	.875	1.00
1929	.85	1.15	.93	.50	1.20	.875	1.00
1930	.85	1.03125	.975	.50	1.20	.875	1.00
1931	.85	1.025	.975	.35	.875	.875	.70
1932	.70	1.00	.825	.40	1.00	.70	.80
1933	.70	.91	....	....	1.00	.70	.80
1934	.70	.825	.825	....	.875	.70	1.00
1935	.70	.825	.825	....	.875	.70	1.00
1936	.77	.825	.95	.30–.40	.875	1.00	1.00
1937	.85	1.14	1.025	.40	1.00	1.10	1.15
1938	.85	1.14	1.025	.40	1.00	1.25	1.15
1939	.85	1.14	1.025	.40	1.00	1.25	1.15
1940	.85	1.186	1.025	.40	1.00	1.25	1.15
1941	.85	1.214	1.025	.4583	1.00	1.25	1.15
1942	1.00	1.214	1.063	.65	1.075	1.25	265

Carpenters

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.50	$0.625	$0.65	$0.525	$0.625	$0.625	$0.56
1914	.55	.625	.65	.45	.625	.625	.56
1915	.55	.625	.65	.45	.625	.625	.56
1916	.57	.625	.70	.45	.625	.625	.56
1917	.60	.69	.70	.45	.65	.68	.65
1918	.65	.69	.70	.55	.70	.75	.825
1919	.75	.75	.80	.65	.825	.875	.93
1920	1.00	1.125	1.25	.75	1.00	1.06	1.00
1921	1.00	1.125	1.25	.75	1.25	1.125	.875
1922	1.00	1.125	1.10	.75	1.10	1.04	.875
1923	1.05	1.125	1.25	.75	1.25	1.04	1.00
1924	1.05	1.3125	1.17	.76	1.525	1.00	1.00
1925	1.0875	1.3125	1.3475	.6025	1.50	1.00	1.0825
1926	1.20	1.45	1.39	.6575	1.50	1.00	1.125
1927	1.25	1.50	1.30	.95	1.50	1.125	1.125
1928	1.279	1.50	1.50	1.00	1.50	1.125	1.125
1929	1.38	1.55	1.47	1.00	1.50	1.125	1.125
1930	1.375	1.65	1.625	1.00	1.50	1.125	1.125
1931	1.175	1.45	1.625	.60	1.50	1.125	.875
1932	1.04	1.33	1.40	.60	1.275	.96	.695
1933	1.065	1.375	1.3125	.60	1.25	.90	.73
1934	.9375	1.40	1.3125	1.00	1.25	1.05	.83
1935	.9275	1.40	1.3156	1.00	1.25	1.10	1.00
1936	.937	1.40	1.50	.88	1.25	1.12	1.00
1937	1.14	1.60	1.57	1.06	1.35	1.31	1.23
1938	1.343	1.75	1.625	1.125	1.25	1.25	1.25
1939	1.375	1.75	1.625	1.125	1.25	1.25	1.25
1940	1.375	1.81	1.625	1.125	1.333	1.25	1.25
1941	1.24	1.85	1.625	1.099	1.333	1.291	1.325
1942	1.417	1.85	1.656	1.167	1.50	1.385	1.415

Plasterers

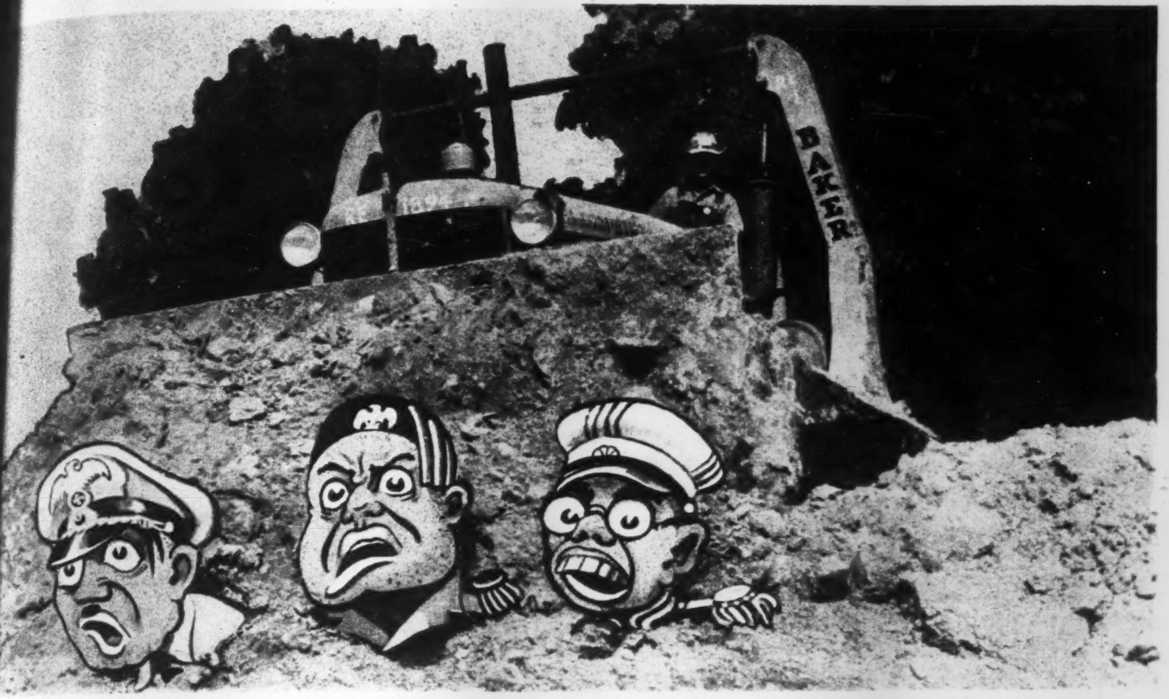
	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.65	$0.69	$0.75	....	$0.75	$0.875	$0.75
1914	.65	.69	.75	....	.75	.875	.75
1915	.65	.69	.75	....	.75	.875	.75
1916	.70	.75	.75	....	.75	.875	.75
1917	.70	.75	.75	....	.75	.875	.875
1918	.70	.75	.81	....	.875	1.00	1.00
1919	.80	.90	.875	....	1.00	1.125	1.125
1920	1.00	1.25	1.25	....	1.25	1.25	1.25
1921	1.25	1.25	1.25	....	1.375	1.375	1.25
1922	1.125	1.25	1.10	....	1.375	1.275	1.125
1923	1.125	1.25	1.50	....	1.50	1.275	1.25
1924	1.25	1.50	1.50	....	1.75	1.275	1.375
1925	1.25	1.50	1.50	....	1.75	1.50	1.375
1926	1.50	1.75	1.50	....	1.75	1.50	1.375
1927	1.50	1.75	1.625	....	1.75	1.50	1.375
1928	1.50	1.75	1.625	....	1.75	1.50	1.50
1929	1.50	1.75	1.625	....	1.75	1.375	1.50
1930	1.625	1.925	1.70	....	1.75	1.375	1.50
1931	1.50	1.7125	1.70	$1.00	1.75	1.375	1.1875
1932	1.625	1.50	1.375	1.25	1.50	1.10	1.20
1933	1.375	1.50	1.375	....	1.50	1.10	1.20
1934	1.231	1.50	1.50	1.00	1.50	1.38	1.18
1935	1.375	1.50	1.50	1.00	1.50	1.25	1.375
1936	1.375	1.50	1.50	1.00	1.50	1.35	1.25
1937	1.625	1.80	1.62	1.00	1.51	1.51	1.54
1938	1.625	2.00	1.70	1.00	1.58	1.65	1.60
1939	1.625	2.00	1.70	1.00	1.58	1.60	1.60
1940	1.625	2.00	1.70	1.00	1.722	1.60	1.60
1941	1.625	2.00	1.70	1.271	1.75	1.639	1.6375
1942	1.65	2.00	1.825	1.50	1.75	1.681	1.715

Structural Ironworkers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.625	$0.625	$0.68	$0.625	$0.65	$0.75	$0.625
1914	.625	.625	.68	.625	.65	.75	.625
1915	.625	.625	.68	.625	.65	.75	.625
1916	.625	.66	.68	.625	.675	.75	.625
1917	.68	.68	.69	.625	.70	.75	.75
1918	.80	.80	.70	.75	.80	.875	.875
1919	.80	.875	.875	.80	.925	1.00	1.00
1920	1.00	1.125	1.25	1.00	1.25	1.125	1.125
1921	1.00	1.125	1.25	....	1.25	1.25	1.125
1922	1.00	1.125	1.05	....	1.06	1.125	1.00
1923	1.05	1.125	1.05	1.05	1.25	1.125	1.125
1924	1.16	1.29	1.25	1.00	1.45	1.125	1.125
1925	1.1375	1.4675	1.36	1.135	1.50	1.125	1.125
1926	1.23	1.60	1.405	1.25	1.50	1.125	1.125
1927	1.25	1.75	1.50	1.55	1.50	1.375	1.155
1928	1.3125	1.75	1.50	1.75	1.50	1.375	1.215
1929	1.375	1.81	1.57	1.63	1.57	1.375	1.25
1930	1.375	1.925	1.625	1.25	1.75	1.375	1.25
1931	1.375	1.925	1.625	.75	1.75	1.375	1.1875
1932	1.205	1.675	1.375	.75	1.50	1.13	1.13
1933	1.14	1.65	1.35	.75	1.47	1.20	1.10
1934	1.20	1.62	1.35	1.00	1.47	1.375	1.13
1935	1.20	1.65	1.35	1.125	1.47	1.375	1.23
1936	1.20	1.58	1.50	1.10	1.47	1.375	1.25
1937	1.375	1.79	1.58	1.25	1.73	1.44	1.39
1938	1.479	1.925	1.70	1.25	1.75	1.50	1.50
1939	1.60	1.925	1.70	1.25	1.75	1.50	1.50
1940	1.5625	1.9625	1.70	1.302	1.75	1.60	1.50
1941	1.50	2.00	1.70	.1469	1.75	1.60	1.5375
1942	1.588	2.00	1.725	1.50	1.75	1.625	1.615

Common Laborers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.35	$0.225	$0.40	....	$0.25	$0.27	$0.375
1914	.35	.225	.40	....	.25	.31	.375
1915	.35	.25	.40	....	.25	.31	.375
1916	.35	.25	.425	....	.25	.31	.375
1917	.375	.30	.45	....	.30	.375	.4375
1918	.40	.405	.50	....	.365	.43	.56
1919	.40	.405	.575	....	.425	.625	.6875
1920	.6875	.75	1.00	....	.6075	.75	.75
1921	.6875	.60	1.00	....	.6075	.81	.75
1922	.6875	.60	.725	....	.5575	.625	.625
1923	.6875	.615	.725	....	.6075	.625	.625
1924	.6625	.6875	.8175	$0.335	.70	.525	.625
1925	.6025	.6525	.8175	.31	.6525	.525	.5625
1926	.615	.815	.86	.30	.6525	.525	.5675
1927	.595	.90625	.8875	.325	.5875	.55	.64
1928	.6025	.90625	.90	.325	.60	.55	.678
1929	.625	.985	.92	.29	.61	.57	.70
1930	.625	1.03125	.975	.275	.6375	.6875	.70
1931	.60	.65625	.7375	.20	.6125	.59375	.60
1932	.575	.645	.665	.225	.56	.56	.485
1933	.548	.725	.784	.248	.6223	.64	.48
1934	.55	.8475	.825	.30	.7875	.64	.53
1935	.575	.68	.825	.30	.7875	.625	.60
1936	.581	.65	.95	.35	.7875	.651	.60
1937	.725	.91	.99	.35	.86	.75	.87
1938	.735	.912	1.025	.35	.663	.65	1.00
1939	.725	.912	1.025	.35	.663	.65	.908
1940	.725	.912	1.025	.35	.804	.745	.90
1941	.7875	.934	1.025	.4167	.875	.842	.975
1942	.879	.991	1.056	.6375	.8875	.8875	1.058



Direct Down-Pressure on the Axis!

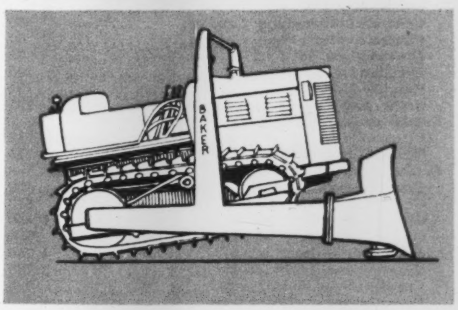
The exclusive direct lift and down-pressure of the blade on Baker Hydraulic Bulldozers and Gradebuilders is a pain in the neck to Axis chest thumpers.

This simple, positive method of control permits the entire weight of the tractor front end to be exerted on the blade—the blade does not depend on its weight alone to force it into the ground. That's why Bakers get out bigger loads faster, every trip, all through each shift.

Their ruggedness and simplicity cuts maintenance costs to the bone. Their design makes the tractor engine more accessible. And they have all of the other features—moldboard level on rough ground, quick interchangeability of moldboards, tractor back end available for winch, etc. that you want in a bulldozer.

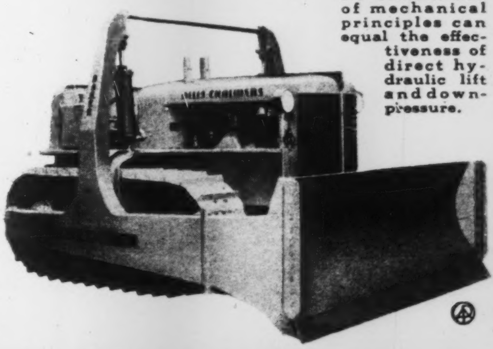
Beside rushing camps, landing fields and war plant sites to completion, Bakers are making landing strips in dense jungles and on desert sands, clearing debris from bombed cities, extending military roads in the frozen North and bringing direct down-pressure to bear on foes of democracy in other ways.

THE BAKER MANUFACTURING CO.
567 Stanford Avenue Springfield, Illinois



Baker Hydraulic Bulldozers *really* bear down!

No combination of mechanical principles can equal the effectiveness of direct hydraulic lift and down-pressure.



BAKER

The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

Epuipment Rental Rates

EQUIPMENT RENTAL RATES were established May 11, 1942 by the Maximum Price Regulation No. 134 with rates fixed at about those of the Associated Equipment Distributors "Green Book."

As revised under dates of Oct. 16 and Nov. 23 the regulation lists dollar and cents maximum rental rates for month, week or day for most machines common to construction. Rates given are for actual use of not more than 8 hours in a calendar day with a maximum of 50 percent added for use up to 16 hours and 100 percent up to 24 hours. Prices are for machines "bare" without fuel, lubricants or operators, or for repairs or maintenance charges.

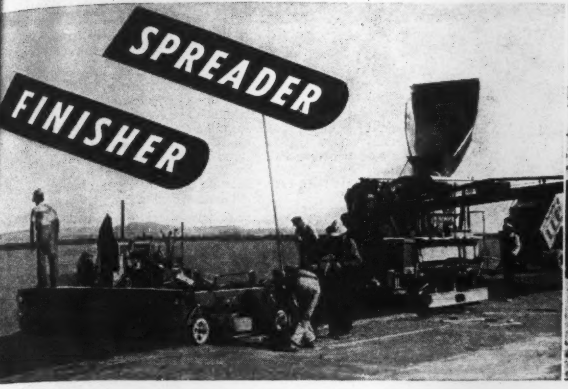
Sample equipment rental rates from Maximum Price Regulation No. 134 through Amendment No. 5

	Per Month	Per Week	Per Day
Air Compressors			
Portable, gasoline 95–130 cu. ft. 100 psi	$130	$43	$11.00
Portable, gasoline 180–260 cu. ft. 100 psi	260	87	22.00
Portable, diesel 180–260 cu. ft. 100 psi	298	99	25.00
Portable, diesel 460–560 cu. ft. 100 psi	608	203	51.00
Stationary, electric 160–215 cu. ft. 100 psi	155	52	13.00
Stationary, electric 470–570 cu. ft. 100 psi	280	93	23.00
Stationary, electric 900–1 200 cu. ft., low pressure	365	121	30.00
Air Tools			
Clay spades, small	20	10	2.50
Drifters	65	22	6.00
Hoists to 1500-lb. single-drum	50	18	4.50
Hoists 1500–2500 lb. double-drum	80	27	6.50
Hose, over ⅝ in. per 50-ft. length	6	3	1.50
Jack-hammer 51–68 lb	35	12	3.00
Paving breakers 70–90 lb	35	15	3.50
Rivet hammers	25	10	3.50
Vibrators, concrete, medium	45	18	4.50
Wagon drill (with air hoist)	165	50	10.00
Boilers			
Vertical 18–32 hp	75	25	6.50
Vertical 32–55 hp	100	33	8.50
Horizontal 55–70 hp	110	37	9.00
Horizontal 90–125 hp	175	58	15.00
Buckets			
Clamshell ⅜ cu. yd	67	22	5.50
Clamshell ¾ cu. yd	90	30	7.50
Clamshell 1½ cu. yd	140	46	11.50
Concrete bottom-dump 1 cu. yd	30	10	2.50
Concrete bottom-dump 2 cu. yd	50	17	4.25
Dragline 1 cu. yd	85	28	7.00
Dragline 1½ cu. yd	105	35	8.75
Dragline 2 cu. yd	125	42	10.50
Orangepeel 1¼ cu. yd	175	58	14.50
Bulldozers—see tractors			
Concrete carts 6 cu. ft. rubber tired	12	4	1.00
Concrete carts 9–11 cu. ft. rubber tired	15	5	1.50
Cranes (capacity at ft. radius)			
Crawler gasoline 5–7 ton 12	450	150	38.00
Crawler gasoline 14–19 ton 12	675	225	56.00
Crawler gasoline 18–26 ton 20	1,400	467	117.00
Crawler diesel 14–19 ton 12	800	267	62.00
Crawler diesel 18–26 ton 20	1,700	567	142.00
Crawler diesel 14–20 ton 45	2,725	908	227.00
Crawler steam 18–24 ton 12	725	242	60.00
Locomotive gas 27–32 ton 12	1,300	430	108.00
Locomotive steam 27–32 ton 12	1,180	393	98.00
Truck-mounted gas 7–9 ton 10 (per hour $10)	700	230	58.00
Truck-mounted gas 12–20 ton 10 (per hr. $17.50)	925	300	77.00
Crushers (without accessories or power)			
Openings 9x16	85	28	7.00
Openings 10x30	190	63	16.00
Openings 12x36	265	88	22.00
Derricks			
Stiff-leg wood 3½-4½ ton	100	33	8.50
Stiff-leg 4–6 ton 50–80 ft. boom	215	72	18.00
Stiff-leg 13–17 ton 70–100 ft. boom	390	130	33.00
Stiff-leg 32–42 ton 70–100 ft. boom	555	185	46.00
Guy 13–17 ton 70–110 ft. boom	245	82	20.00
Guy 35–45 ton 100–120 ft. boom	450	150	37.00
Engines			
Gasoline with clutch 22–30 hp	50	17	4.50
Gasoline with clutch 55–70 hp	90	30	7.50
Diesel with clutch 22–30 hp	75	25	6.50
Diesel with clutch 55–70 hp	135	45	11.00
Diesel with clutch 90–115 hp	245	82	20.00
Finegraders 11–16 ft. width	510	170	42.00
Finishing machines			
Concrete-floor (powered)	60	20	5.00
Road finishers 12–18 ft. roadway	394	131	33.00
Road finishers 24–30 ft. roadway	495	165	41.00
Bituminous machines	750	250	63.00
Graders			
Single drive—8,600 to 14,000 lb. gasoline	275	92	23.00
Tandem drive 19,000—21,000 lb. gasoline	470	156	39.00
Tandem drive 18,500—21,000 lb. diesel	525	173	42.00
Towed-power operated 9–11 ft	190	63	15.75
Pile hammers			
Drop 1,500–2,250 lb	20	7	2.00
McKiernan Terry #2	70	20	5.00
McKiernan-Terry #7	135	45	11.00

	Per Month	Per Week	Per Day
Pile Hammers (Cont'd)			
McKiernan-Terry #10B2 or 3	$270	$90	$22.50
Vulcan #1	204	68	17.00
Vulcan #00	350	115	30.00
Vulcan Pile Extractor #800	240	80	20.00
Tank Car Heater 2–3 car capacity	210	75	20.00
Hoists			
Gasoline single-drum 29–42 hp	95	32	8.00
Gasoline double-drum 22–28 hp	100	33	8.50
Gasoline double-drum 55–65 hp	175	58	15.00
Electric single drum 17–27 hp	75	25	6.50
Electric double drum 37–47 hp	138	46	11.50
Air 1,500–2,500 lb	65	22	5.50
Chain 1½-2½ ton	20	7	2.00
Chain 4-6½ ton	30	10	2.50
Mixers, Bituminous			
Central Plant 30–50 ton per hr. (gradation control)	1,573	524	131.00
Central Plant 70–90 ton per hr. (gradation control)	2,217	739	185.00
Traveling Plant 1¼-1¾ cu. yd. per min	1,085	362	90.00
Mixers, Concrete			
Power charger 6S to 8½S	85	28	7.00
Power charger 12S to 16S	155	52	13.00
Batch hopper 25S to 30S	210	70	17.50
Paver 24 to 30 cu. ft	785	295	74.00
Paver 30 to 37 cu. ft	1,335	444	111.00
Pumpcrete (concrete pump)			
Model 160 single cylinder	465	155	39.00
Model 200 double cylinder	1,065	355	90.00
Pumps			
Centrifugal, gasoline, 2 in. 7 to 10 M	40	13	3.00
Centrifugal, gasoline, 4 in. 30 to 40 M	80	27	7.00
Centrifugal, gasoline, 8 in. 125 M	195	65	16.00
Diaphragm force or open 3 in. double	50	17	5.00
Diaphragm force or open 4 in. double	60	20	5.00
Rollers			
Two-wheel tandem 5-9½ ton gasoline	250	83	21.00
Two-wheel tandem 12½-17½ ton gasoline	325	108	27.00
Three-wheel tandem 9½-14½ ton gasoline	335	112	28.00
Three-wheel tandem 7½-9 ton gasoline	270	90	22.00
Three-wheel tandem 11–13 ton gasoline	425	142	35.00
Sheepsfoot, double drum	90	30	7.50
Sheepsfoot, triple drum	175	58	15.00
Shovels and back-hoes (dipper included)			
Crawler, gasoline ⅜ cu. yd	440	147	37.00
Crawler, gasoline ¾ cu. yd	605	201	50.00
Crawler, gasoline 1¼ cu. yd	880	293	73.00
Crawler, diesel ¾ cu. yd	715	238	60.00
Crawler, diesel 1¼ cu. yd	1,045	348	87.00
Crawler, diesel 2 cu. yd	1,980	660	165.00
Surveying instruments			
Levels	15	5	1.25
Transits	20	7	1.75
Tractor, crawler, and attachments			
33–41 hp. gasoline	265	88	22.00
66–85 hp. gasoline	425	142	35.00
46–52 hp. diesel	410	137	34.00
72–89 hp. diesel	645	215	54.00
89–135 hp. diesel	775	258	65.00
Winch, any size, double drum	75	25	6.50
Bulldozer 66–89 hp. tractor	120	40	10.00
Angledozer 66–89 hp. tractor	148	49	12.00
Tractors-wheeled			
4 wheel, rubber tired diesel 93–103 hp	530	175	45.00
4 wheel, rubber tired diesel 140–160 hp	855	285	70.00
2 wheel rubber tired diesel 145–160 hp	780	260	65.00
2 wheel rubber tired diesel 195–210 hp	1,385	461	115.00
Scrapers and Wagons (heaped measure)			
Scraper 7–10 cu. yd	250	85	21.00
Scraper 17–22 cu. yd	575	190	48.00
Scraper 29–37 cu. yd	1,025	340	85.00
Crawler wagons, bottom dump 9½–12½ cu. yd.	240	80	20.00
Crawler wagons, bottom dump 14½–20½ cu. yd.	370	123	31.00
Vibrators, gasoline, flexible shaft			
Up to 1½ hp. 23 ft. shafting	40	13	3.50
2½-4 hp	60	20	5.00
Welding Machines, wheels or skids			
Gasoline-engine driven up to 250 amp	74	25	6.00
Gasoline-engine driven 350 to 500 amp	114	38	9.50
60 cycle motor driven up to 250 amp	35	12	3.00
60 cycle motor driven 350 to 500 amp	56	19	4.50

JAEGER PAVING TEAMS Have Made It Possible to Build Roads and Airports...

BETTER, FASTER, at LOWER COST



On 10-12 Ft. Slab

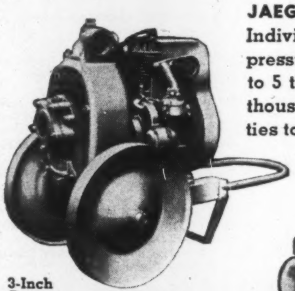
On 25 Ft. Slab

It is a recognized fact that the speed records made in paving concrete military roads and airport runways (exceeding 275 linear ft. per hour on 25 ft. width and 475 ft. per hour on 10 ft. width) have been made possible by the use of the finishing machine and the concrete spreader, both originated and developed by Jaeger-Lakewood engineers.

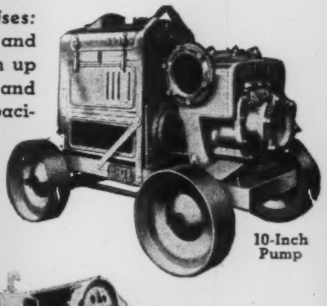
JAEGER RE-MIXING SCREW CONCRETE SPREADER, by replacing hand shovelers, makes it possible to handle and spread the stiffest concrete, as dry as 1/2" slump, as fast as dual drum or multiple pavers can mix and pour. Remixing spreader screw eliminates all segregation, densifies and improves the strength and uniformity of the slab. Single operator spreads the piles, strikes off, ready for final finishing. Also adaptable for spreading and finishing bituminous material.

JAEGER-LAKEWOOD HIGH SPEED FINISHER is the most flexible machine ever developed for finishing dry, stiff concrete at today's fast pace. Transmission in front of engine gives direct lever control of all functions—3 working speeds of 8, 12, 18 ft. per minute and 3 independent screed speeds, all gear-selected, plus unlimited speed range by engine throttle. Hydraulic screed lift, "velvet touch" screeding, 4-5 ft. telescopic width adjustment, many advanced features. Standard and vibratory models.

JAEGER "SURE-PRIME" — *the Pumps that Exceed Their Promises:* Individually factory tested and certified for vacuum, capacity and pressure, regularly exceed their guaranteed performance — with up to 5 times faster automatic priming, big air and water capacity and thousands of extra hours of service. Sizes 1½ to 10 inches — capacities to over 200,000 gallons per hour.



3-Inch Pump

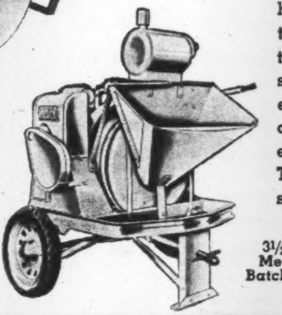


10-Inch Pump

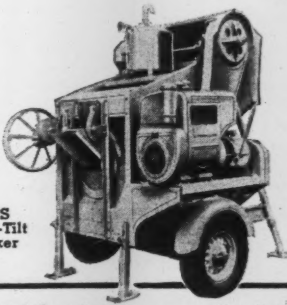
JAEGER "SPEEDLINE" MIXERS

in sizes up to one-half yard, have machined steel drum tracks, enclosed automotive-type transmission, run more smoothly and quietly. Fastest known loading and discharge. Perfectly balanced, easy to trail and move on Timken bearing wheels, spring shock absorbers.

JAEGER PUMPS have patented high-velocity "Priming Jet," high pressure shells of self-cleaning design, replaceable liners, longest-life seal, oversize construction.



3½S with Measuring Batch Hopper



10S Non-Tilt Mixer

JAEGER MIXERS are the recognized leader throughout the world—for fast production, easy handling and long life, trouble-free service.

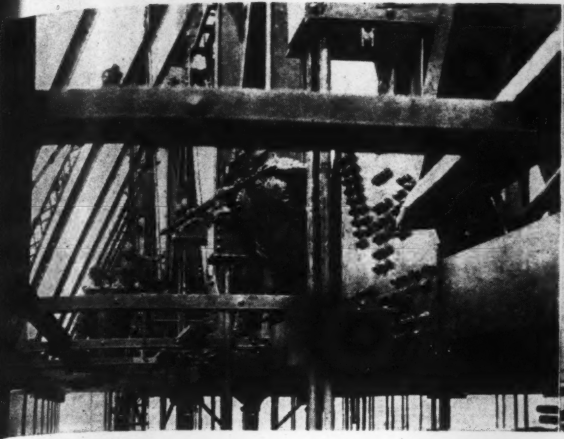
THE JAEGER MACHINE CO.

200 Dublin Avenue, Columbus, Ohio
Service in Over 100 Principal Cities

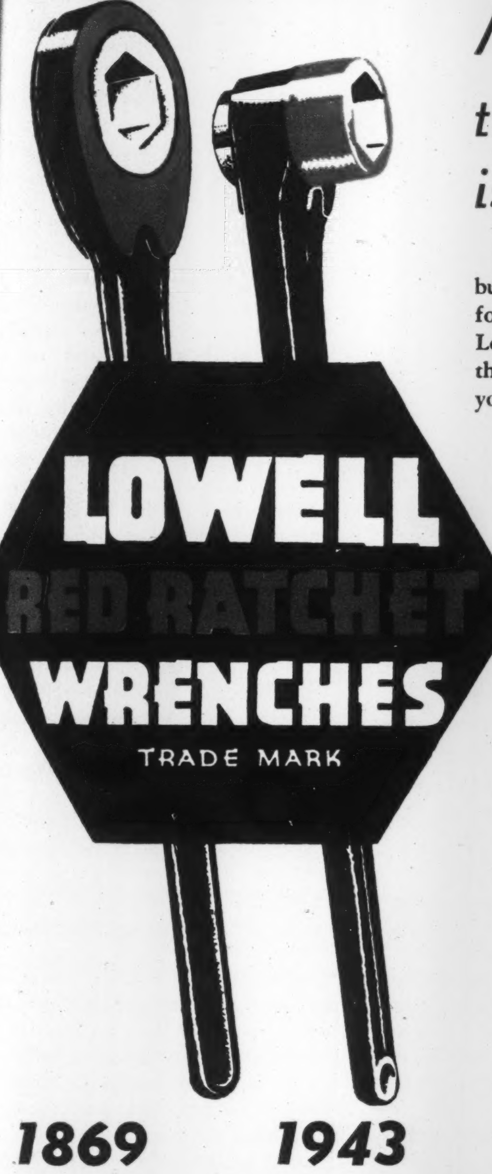
Digest of OPA Price Regulations Affecting Construction

MPR No.	Items Covered	Date Effective	Purpose
6.	Iron and Steel Products	April 17, 1941	Ceiling established.
	(Revised)	April 17, 1941	Change transportation charges; basing point price change; export price alternate; rail and water combination shipments.
	(Revised)	Feb. 4, 1942	Dislocated tonnage clarification.
13.	Douglas Fir Peeler Logs and Douglas Fir Plywood	May 1, 1941	Ceiling established.
	(Amended)	Sept. 25, 1941	Enable industry to clear up outstanding contracts.
	(Amended)	Feb. 10, 1942	Permits estimated weight use.
	(Revised)	July 25, 1942	Prices revised to enable adaptation to WPB order L-150. "Sound 1 side" price set; other prices unchanged.
	(Amended)	Sept. 21, 1942	Dollars and cents ceiling set for three lower grades of plywood.
	(Amended)	Dec. 5, 1942	Extended to cover wholesale and retail price levels for plywood.
	(Amended)	Feb. 8, 1943	Warehouses and yards acting as distribution plants placed under same price ceiling.
19.	Southern Pine Lumber	Sept. 5, 1941	Ceiling set; $3.00 lower.
	(Revised)	Sept. 5, 1941	Ceiling increased prior to effective date.
	(Amended)	Nov. 24, 1941	Ceiling on additional products; flooring raised; mixed shipments; retail direct mill shipments; bevel and drop siding reduced; planing and drying changes.
	(Amended)	July 31, 1942	Lumber previously exempt as result of delivery contracts now subject to ceiling prices of regulation.
	(Amended)	Sept. 10, 1942	"Special soft-textured finish" premium allowed at $7.50 per M ft.
	(Amended)	Oct. 8, 1942	Adjustable pricing on deliveries for limited period.
	(Amended)	Nov. 5, 1942	Maximum prices for large short-leaf pine timbers changed.
	(Amended)	Feb. 1, 1943	Ceiling raised on 1-in. boards; reduced on "finish," higher grade boards.
26.	Douglas Fir Lumber	Oct. 1, 1941	Ceiling set; all types; aver. reduction $10 per M ft.
	(Amended)	Nov. 1, 1941	$3.50 allowance for retail sales under specified conditions; shop lumber, flooring and ceiling lumber added.
	(Amended)	July 1, 1942	Lumber previously exempt as result of delivery contracts now subject to ceiling prices of regulation.
	(Amended)	July 11, 1942	Special bending and density lumber specifications allowed premium price.
	(Amended)	July 10, 1942	Aircraft fir for military and lend-lease, exempted from ceiling; application to be filed with OPA.
	(Amended)	Sept. 19, 1942	Ceiling set on lumber items not specifically quoted or covered by MPR-26.
	(Amended)	Nov. 5, 1942	Pontoon lumber prices adjusted.
	(Amended)	Jan. 7, 1943	Plywood plant by-product lumber ceiling set at dollars and cents maximum for fir under MPR-26; rail and truck haul charges added as specified.
40.	Builders' Hardware	Oct. 21, 1941	Mfr. and jobbers' prices stabilized at Oct. 15 level.
	(Amended)	Feb. 4, 1942	Ceiling set at max. price prevailing 15-day period prior to Oct. 15.
44.	Douglas Fir Doors	Dec. 10, 1941	Ceiling reduces prices 15%.
45.	Asphalt and Tarred Roofing	Dec. 12, 1941	Ceiling cuts prevailing prices.
	(Amended)	Jan. 6, 1942	Wash., Ore. and Idaho prices set at Aug. 1, 1941 levels.
46.	Railroad Rail, Relaying	Dec. 2, 1941	Maximum prices set.
	(Amended)	Feb. 7, 1942	Transaction report time extended; new basing point; warehouse ceiling lowered; agent commission allowed.
	(Amended)	Feb. 6, 1942	Duluth made basing point, Minneapolis dropped.
	(Amended)	Feb. 7, 1942	Warehouse commitments prior to Feb. 7 allowed at $1.60 per cwt., must complete by Mar. 15.
49.	Resale of Iron and Steel Products	Dec. 15, 1941	Ceiling set at April 16, 1941 level, seconds, rejects, used included.
	(Amended)	Jan. 30, 1942	Export margin increased.
	(Amended)	Feb. 2, 1942	Remove price limitations on wire products and nails in small lots (retail levels).
54.	Douglas Fir Peeler Logs	Dec. 20, 1941	Reset ceilings in MPR 13 in four northwestern districts.
82.	Wire, Cable and Cable Accessories	Jan. 29, 1942	Prices set at Oct. 15, 1941 levels.
88.	Petroleum and Petroleum Products	Feb. 2, 1942	Prices set at Oct. 1 level.
	(Amended)	Feb. 9, 1942	Asphalt and asphalt products allowed increased price.
	(Amended)	Feb. 2, 1942	Export, domestic commitments eased.
	(Amended)	Feb. 19, 1942	Transaction report time extended; increases require reporting.
94.	Western Pine Lumber	Feb. 15, 1942	Ceiling set as of Oct. 1941; down $2 to $5 under prevailing prices.
97.	Southern Hardwood Lumber	Feb. 20, 1942	Mill prices established.
	(Amended)	Mar. 26, 1943	High grade sycamore lumber ceilings raised to former levels.
134.	Construction and Road Equipment Rental	May 11, 1942	Rental rates set at Oct. 1-15 level.
	(Amended)	Sept. 8, 1942	Michigan state constr. and maintenance equip. rates approved.
	(Amended)	Oct. 22, 1942	Added operating or maintenance service charge rates; clarifies preceding order. Some rates climbed.
	(Amended)	Oct. 22, 1942	Major type pump ceilings set.
136.	Machines and Parts, and Machinery Services	May 18, 1942	Specifies Oct. 1 prices, all levels of distribution except retail.
	(Amended)	May 18, 1942	Installation costs set at Mar. 1.
	(Amended)	July 1, 1942	Effective date set at July 1.
	(Amended)	Sept. 9, 1942	Hand-operated tools on March base.
	(Amended)	Oct. 8, 1942	Siren blowers ceiling, Mar. 31 price.
	(Amended)	Oct. 10, 1942	Machine sales rising from rental agreements excluded from MPR-136.
	(Amended)	Oct. 24, 1942	Sale to Army of second-hand snow plows excluded from order.
	(Amended)	Nov. 7, 1942	Storage battery ceiling set.
	(Amended)	Nov. 25, 1942	Simplification of pricing for used machines and parts.
	(Amended)	Nov. 27, 1942	Used refrigeration and air-conditioning sales to gov't. to be paid cost less depreciation, but full original installation cost.
	(Amended)	Dec. 11, 1942	MPR 105 items now included in 136.
	(Amended)	Feb. 5, 1943	Depreciation rate altered on air-conditioning and refrigerating.
	(Amended)	Mar. 22, 1943	Alternate ceilings for batteries.
	(Amended)	Mar. 24, 1943	Price determining method in new or converted plants.
146.	Appalachian Hardwood Lumber	June 1, 1942	Set at Oct. 1–15, 1941 levels
	(Amended)	June 26, 1942	Special grade items price statement required by July 15.
	(Amended)	July 21, 1942	Special grade items ceiling set, approximate Oct. 15, 1941 levels.
	(Amended)	Aug. 3, 1942	Addd'l. special grade items covered.
	(Amended)	Oct. 5, 1942	Add'l. specials listed.
	(Amended)	Oct. 15, 1942	"Non-recurring" specials must be reported by mill, not wholesaler.
	(Amended)	Mar. 16, 1943	Adjustable pricing provisions.
147.	Bolts, Nuts, Screws and Rivets	May 28, 1942	Ceiling set at Oct. 1, 1941 level, except set and cap screws (June 1, 1941).
155.	Central Hardwood Lumber	June 1, 1942	Prices and regions established.
	(Amended)	Oct. 5, 1942	"Recurring special" grade prices set.
159.	Fabricated Concrete Reinforcing Bars	June 15, 1942	Ceilings set, including lump sum contracts for bars.
	(Amended)	July 28, 1942	Detailed inventory statement by fabricator eliminated; pricing simplified; adjustable pricing permitted; bar segregation for pricing simplified.
	(Amended)	Jan. 25, 1943	Conditions applying to lump-sum and average price bids and for furnishing bars used to reinforce concrete struct.
166.	Zinc Oxides	May 11, 1942	Ceiling set at 6¾c. per lb., down ¼c.
	(Amended)	June 22, 1942	Increased ¼c.
	(Amended)	July 9, 1942	Changes date of above amendment to May 11.
188.	Specified Building Materials and Consumers Goods (Other than Apparel)	Aug. 1, 1942	Methods for determining maximum prices for new lines and goods.
	(Amended)	Oct. 6, 1942	Four methods for pricing; prices must be submitted to OPA for approval.
	(Amended)	Jan. 18, 1943	More products added to list.
	(Amended)	Jan. 15, 1943	Substitution in paint products without reducing maximum price.
	(Amended)	Mar. 11, 1943	Method for obtaining price relief in hardship cases.
206.	Vitrified Clay Pipe and Allied Products	Aug. 22, 1942	Ceilings set in eastern, southern and east central areas of U. S. at levels prevailing Oct. 1–15, 1941.
	(Amended)	Feb. 3, 1943	Some shortages necessitate new pricing method for distant points.
215.	Distribution Yard Sales of Softwood	Sept. 10, 1942	Ceilings set on southern and western pine, fir, and hemlock distribution yard sales.
	(Amended)	Jan. 25, 1943	Ceiling on Sitka spruce, redwood, etc.
216.	Railroad Ties	Sept. 5, 1942	Ceiling set at buyer's level prevailing Jan. through Mar., 1942.
	(Amended)	Oct. 15, 1942	Purchase information report needed.
	(Amended)	Nov. 12, 1942	Method used when railroad did not purchase ties in 1st. 1942 quarter.
	(Amended)	Dec. 26, 1942	Revised ceiling price, 10% over Mar. 1942.
219.	Northeastern Softwood Lumber	Sept. 19, 1942	Ceiling set for white pine at point of origin.
	(Amended)	Jan. 7, 1943	Special provision for transportation charges in 1938 hurricane area.
	(Amended)	Feb. 19, 1943	Ceilings raised $2.50 per M ft.
222.	Northern Softwood Lumber	Sept. 23, 1942	Ceilings at Oct. 1941 levels.
	(Amended)	Oct. 23, 1942	Duty and custom brokerage fees not to be added on Canadian lumber. Two basing points established.

(*Continued on page* 140)



Many a LOWELL that served in the last war is still in War Service Today



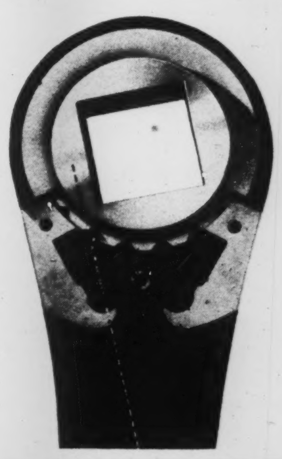
You can take it for granted that new and veteran Lowells are busy on War construction. The thing to remember for *now*—and for after the War—is the fact that *a Lowell lasts for years.* Every Lowell is a husky, simple tool that speeds work, saves effort, gets the job done *right.* If your dealer can't supply you quickly today, you know the reason why . . . —

LOWELL REVERSIBLE RATCHET WRENCHES

are made in a wide variety of types and sizes, both hex and square, suited to many kinds of heavy construction erecting and maintenance work.

Straight Line LEVERAGE!

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear in a *straight line* and with a square contact. The pawl is in compression only — no shear, no tension, no torsion. The shipper carries none of the load. This strong construction insures steady service.



LOWELL WRENCH CO., WORCESTER, MASS., U. S. A.

Many types of construction machines are made available to contractors from a Corps of Engineers equipment pool.

Army Equipment Pool Aids Contract Work

***Contents in Brief**—An equipment pool maintained by the Corps of Engineers makes machines available to contractors for use on government work. Users pay a rental, lower than ceiling rate, which is deducted from estimates due. Repairs are handled at established equipment dealers' shops on an hourly basis. Not only does the pool assure widest use of available machines but it aids in maintaining contractor and equipment repair organizations.*

CONTRACTORS ENGAGED for government work in the South Atlantic Division of the Corps of Engineers are enabled to rent necessary construction machines from a central equipment pool operated by the division. The original stock of equipment held in the pool was secured by the government largely under recapture rental clauses, but these stocks are now supplemented by government purchase of essential machines through channels not open to civilian buyers. A definite rental schedule has been established for all the equipment, and the rent is deducted from payments due contractor. Machines can be used only on Corps of Engineers' work.

In making a bid on work the contractor states what equipment he has, or can get from private sources, and what he expects to ask the government to supply. The bidder is given a schedule of rates, substantially less than the ceiling rates established by the Office of Price Administration for equipment rental. Amount of the rental for government-owned machines must be included in the bid prices. Equipment that a bidder himself can supply is a factor in making an award that will be most advantageous to the government.

All kinds of construction machines are available because the South Atlantic Division has had one of the largest programs to provide housing, training facilities, and manufacturing plants for the Army. Most of the equipment used on this work is now held in the central pool.

Rental procedure provides that the contractor requiring machines request their procurement through the area or post engineer in immediate charge of the work. He in turn passes the request to the district office and from there it goes to the division equipment pool headquarters. This sounds like it might require a considerable amount of time but when there is an immediate need, and usually machines are wanted "yesterday," requests are handled by phone, confirmed by teletype, and quite often the machines are moving well ahead of official signatures.

Three men in the Division office control the allocation and movement of all machines. These equipment supervisors have final power to determine what machines go where, and when they must be transferred. They are in close contact with all branches of the Division office and thus are in position to know what projects should be given preference.

Machines are rented to the contractor for one-, two- or three-shift operation, as the work at hand may warrant. Heavy earth-moving equipment is usually rented only for around-the-clock operation. The contractor must pay charges for shipping to the work, much as when renting from equipment distributors and, if the machines are shipped out to a repair shop, he may be required to pay the shipping-out cost as well. Generally, however, machines move direct to other work that pays the transportation charges.

Light tools such as vibrators, small pumps, drills, circular saws and pneumatic machines are handled by the equipment pool on a buy-and-sell basis on appraised valuation. To

THE 'AIR ARM' OF INDUSTRY

Applying Compressed Air for countless jobs is one of Ingersoll-Rand's major contributions for the industries of war and peace.

Armies of drill runners mining the vital metals, building the strategic roads and air fields, driving the tunnels for highways, railroads and water—all with rock drills powered by Compressed Air.

Thousands of men, women too, building planes, ships, tanks, autos, trucks, locomotives, bridges, machines, and process plants—with drills, grinders, riveting hammers, chippers, hoists—powered by Compressed Air.

Today's war production also emphasizes the use of Compressed Air for propelling torpedoes, scavenging guns, starting Diesels, for painting, for ship salvage, for blasting sirens, for inflation of tires, for blowing blast furnaces and cupolas to increase steel production. . . .

Ingersoll-Rand has pioneered Compressed Air Systems since 1871, ever developing new and time-saving applications.

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COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS avoid rental bookkeeping these tools are sold to the districts needing them on a basis of current value and are repurchased, when they are no longer needed, at their reduced value. The district offices, however, are obliged to rent them to contractor users on a monthly rate or some other mutually agreeable arrangement. The government can sell only surplus materials and tools are not in that class.

Government inspection measures

There are 20 experienced equipment inspectors in the field who keep constant check on the government-owned equipment. They watch lubrication, abuse and general operation, making recommendations for improvement where possible and assist in seeing that the right machines, and the proper number, are in use. The inspectors are familiar with job schedules and are in position to advise if more equipment should be acquired to meet necessary dates or if machines can be released to more urgent projects.

The government requires that all machines on rental be well maintained and properly lubricated. Use of full capacity of the machine is recommended, but no overloading or overspeeding is tolerated.

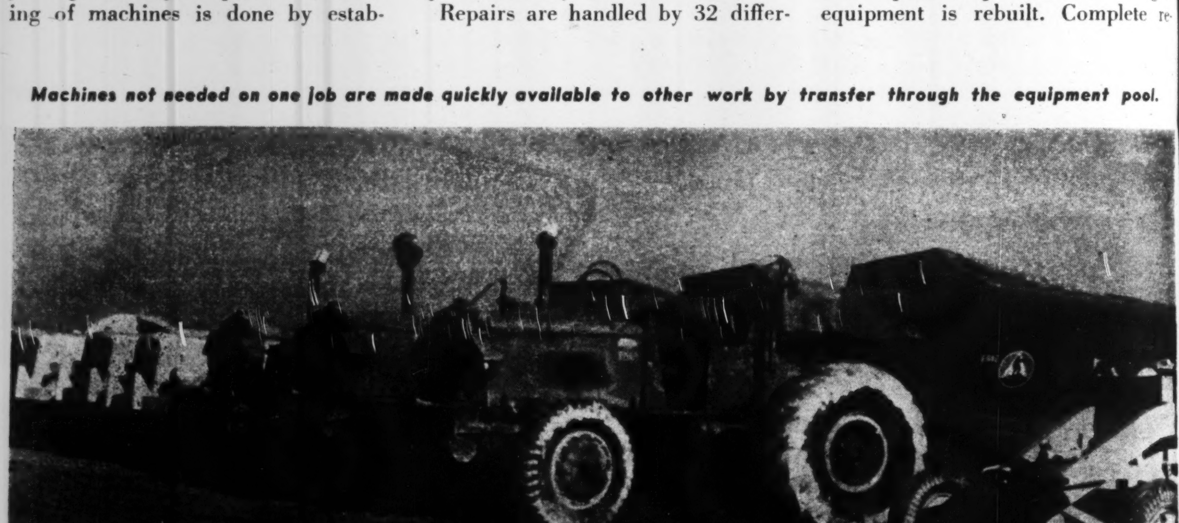
It is general practice for the contractor to maintain a crew for normal job repairs. Major repairs or rebuilding of machines is done by established repair shops throughout the area, under contract with the government. Generally these shops are those of equipment dealers, which were equipped and staffed before the war. Ordinarily, only machines of the types with which a shop is familiar are sent for repairs, but in emergencies a shop may be called upon to do any kind of work.

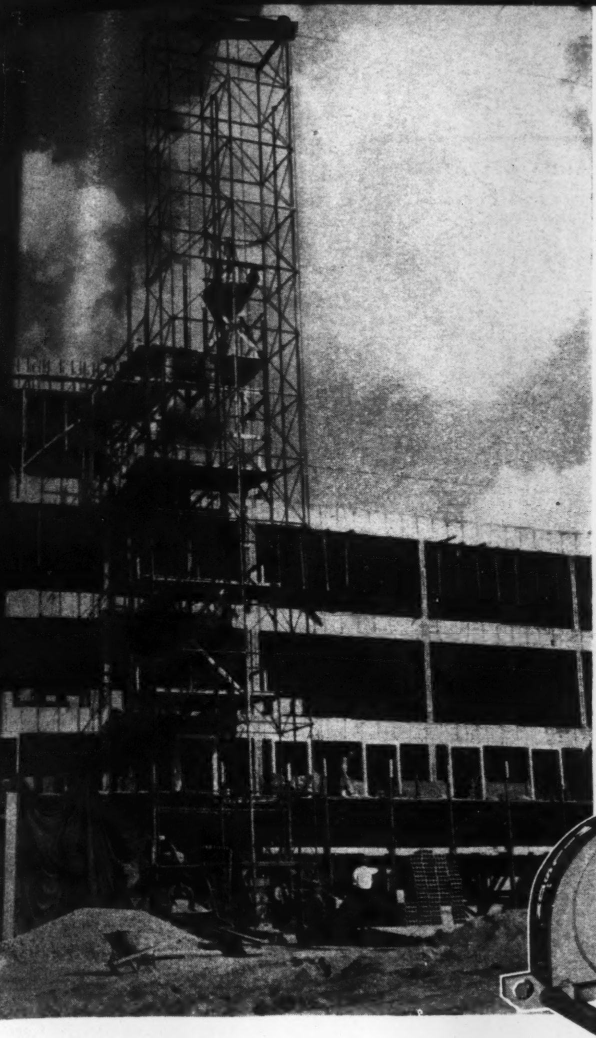
Big machines and big tires are used hard but are well cared for to get greatest efficiency compatible with speed necessary for war construction.

Repairs are handled by 32 different shops on a special contract under which the government pays for time and material. Parts and materials are purchased by the repair shop through usual commercial channels or are supplied by the government from warehouse stocks or on priority orders.

In addition to the contract shops the engineers have established a central repair shop where the largest equipment is rebuilt. Complete re-

Machines not needed on one job are made quickly available to other work by transfer through the equipment pool.





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the Power has Got to be Right!

The power unit of this hoist is equipped with a Pierce Flyball Governor to keep engine speed constant under any load conditions.

PIERCE KEEPS IT THAT WAY!

● When you're thirty or forty feet off the ground you want to be sure there's the *right* amount of power for the load on the hoist—and that it's under full control all the time! Speed of the hoist power-unit must be kept *constant* for efficient, safe operation.

That's where Pierce Flyball Governors come in. They keep engine speed constant by adjusting the fuel throttle automatically and accurately to meet any change in load. Regulation is instantaneous, positive, and dependable because of Pierce's time-proven, mechanical flyball design, and rugged, precision construction.

Standardize on Pierce Flyball Governors for all your equipment. They'll give you long, trouble-free service, outlasting the power-units themselves in most cases!

THE PIERCE GOVERNOR COMPANY
1647 OHIO AVENUE · ANDERSON, INDIANA

Pierce Governors

RENTAL RATES CHARGED CONTRACTORS FOR ONE SHIFT OPERATION.

Add 50 percent for more than 8 hours; 100 percent for more than 16 hours.

Machine	Condition of Equipment Excellent	Very Good	Good	Satisfactory
Asphalt Distributor 1000 gal	$7.84	$6.72	$5.60	$4.48
Road Roller. Tandem 10–14 ton	8.98	7.70	6.42	5.13
Tamping Rollers. Double-drum	2.10	1.80	....	....
Engine—Gasoline 60 hp	1.87	1.60	1.33	1.07
Engine—Diesel 100 hp	5.72	4.90	4.08	3.27
Lighting Plants, Gasoline driven 5 kw	2.10	1.80	1.50	1.20
Crane or dragline—no bucket				
6 ton—½ cu. yd. gasoline	10.67	9.34	8.00	6.67
40–45 ton 2 cu. yd. gasoline	36.34	32.67	28.00	23.34
40–45 ton 2 cu. yd. diesel	45.34	39.67	34.00	28.34
Trucks: Dump 5 cu. yd. gas	13.16	11.28	9.41	7.52
Dump 9 cu. yd. diesel	35.00	30.00	25.01	20.00
Tractors: 45–49 hp. gasoline	7.35	6.30	5.25	4.20
91–94 hp. gasoline	11.67	10.00	8.33	6.67
70–87 hp. diesel	14.84	12.72	12.92	10.33
91–135 hp. diesel	18.08	15.50	10.60	8.48
Bulldozer: 45–62 hp. tractor	2.57	2.20	1.83	1.47
91–135 hp. tractor	3.38	2.90	2.42	1.93

building jobs are done in this well-equipped and adequately-staffed shop located at the division equipment pool headquarters. Here, worn parts are built up by welding or metallizing, and then are dressed to the proper size for reuse.

Before the central control of equipment was instituted various projects had ordered large stocks of repair parts, many of which were not used. These were all transferred to a central supply depot from which all repair shops may draw as required. Some of the parts stocked did not appear to be immediately needed and were "circularized" to other Corps of Engineer divisions for disposal and use. Some seldom needed parts were made available to manufacturers for the distribution to other accounts.

Record-keeping is handled in a separate department. Records of the several thousand machines in use are kept up-to-date on a visible card index. Nine copies of all transfer orders are made, one each for the following: Division equipment file; location file; audit section; inspector; receiving area engineer and district engineer; shipping area engineer and district engineer; and one for the serial number file.

The card shows the movement of the machine and the time, plus description of the equipment and attachments and the mechanical condition. Also noted is the rate of rental to be charged for one-, two- or three-shift operation. The rental of the machine is billed by the division to th district, which deducts the amou from the funds due the contractor an reimburses the division

Need and value of pool

Before the central equipment po was inaugurated, equipment was hel by the various districts. Consequentl it was not available to other distric as long as there was prospect of futur use of the machines. Under the pre ent set-up nearly all available equip ment is kept working most of the tim somewhere in the division, actually 8 percent of full time. If a machine i not needed it can be declared surplu and quickly made available to othe districts or even other divisions. Thi control of all machines has made i possible to assign equipment where i will open "bottlenecks" and thu bring up to schedule a particular par of the work.

The general scheme of makin equipment available to contractor and having it repaired at commercia shops has maintained existing con- tractor and dealer organizations Previous to establishment of this plan such firms were facing extinction be- cause of government acquisition o much of their equipment, which could not be replaced.

Field organizations of the Corps of Engineers, and the contractors using the machines, enthusiastically endorse the plan as being very helpful in the present equipment shortage.

Digest of OPA Maximum Price Regulations Affecting Construction

(*Continued from page* 134)

MPR No.	Items Covered	Date Effective	Purpose
223.	Northern Hardwood Lumber	Sept. 23, 1942	Ceilings at Oct. 1941 levels
	(Amended)	Jan. 6, 1943	Kiln-dried price class revised.
	(Amended)	Mar. 4, 1943	Adjustable price provision added.
224.	Cement	Sept. 23, 1942	New alternate method for pricing cement to war jobs outside shipper's normal selling area.
230.	Reusable Iron and Steel Pipe	Oct. 3, 1942	Cuts ceiling quotations to levels of Oct. 1–15, 1941.
	(Revised)	Feb. 9, 1943	Adds structural pipe; revised and more precise as to odd weights and sizes. Conforms closely to industry practice.
236.	Building Materials (Heating Boiler Conversion Parts)	Oct. 14, 1942	Ceilings on conversion parts set at current levels; installation costs at Mar. 1942, adjusted for wage increase.
	(Amended)	Feb. 11, 1943	Combination grate ceilings included.
251.	Construction and Maintenance Services and Sales of Building and Industrial Equipment and Materials on an Installed or Erected Basis	Nov. 5, 1942	To maintain March 1942 price level; to afford workable means to determine maximum prices at this level; and to maintain constant observation over prices not already under control. Army-Navy war construction exempt.
	(Amended)	Mar. 12, 1943	Cost and cost-plus-fixed-fee contracts exempted for Defense Plant Corp. jobs. Retroactive to Oct. 30, 1942.
	(Amended)	Mar. 22, 1943	Most MPR-251 provisions revoked; maintenance and repair services remain under price control.
253.	Redwood Lumber and Millwork	Nov. 13, 1942	Ceilings set; are below those prevailing in Mar. 1942.
	(Amended)	Dec. 29, 1942	Eureka, Calif. set as basing point in determining delivered prices.
261.	Contract Sales of Finishing Builders' Hardware	Nov. 13, 1942	Ceiling set at highest price received by mfr. between Oct. 1, 1941 and Mar. 31, 1942.
272.	Cast Iron Boilers and Cast Iron Radiation	Nov. 23, 1942	Ceiling set at Oct. 1–15, 1941 levels, about 5 to 12 percent below present.
	(Amended)	Nov. 28, 1942	Adjusted to iron out inequalities between independent jobbers and mfr.'s jobbing outlets.
276.	Asphalt Tile	Dec. 5, 1942	Maximum prices established at Mar. 1942 levels.
	(Amended)	Dec. 5, 1942	Freight charges redefined.
290.	Sitka Spruce Lumber	Jan. 5, 1943	Prices set at Mar. 1942 levels; Canadian, but not Alaskan imports covered.
	(Amended)	Feb. 25, 1943	Alaskan imports under same control.
293.	Stock Millwork—Softwood Lumber Products	Jan. 8, 1943	Generally, Mar. 1942 prices set as ceiling. Industry's special pricing system adopted.
310.	Reusable Structural Steel Shapes and Plates, and Shafting	Feb. 1, 1943	Uniform ceiling of 2.75c. per lb. at shipping point. Mat'l not meeting consumers specifications must be sold as scrap.
317.	Locks and Lock Sets—Building Materials	Feb. 13, 1943	Ceilings generally reflect current price levels. Discounts maintained at Oct. 1941 rates.
323.	Asphalt and Asphalt Products	Feb. 20, 1943	New regulation clarifies and simplifies ceilings set under MPR 88. Generally those from Aug. 1 to Nov. 1, 1941.
324.	Northern White Cedar Fence Posts	Feb. 18, 1943	Dollars-and-cents ceiling set, slightly under existing levels.

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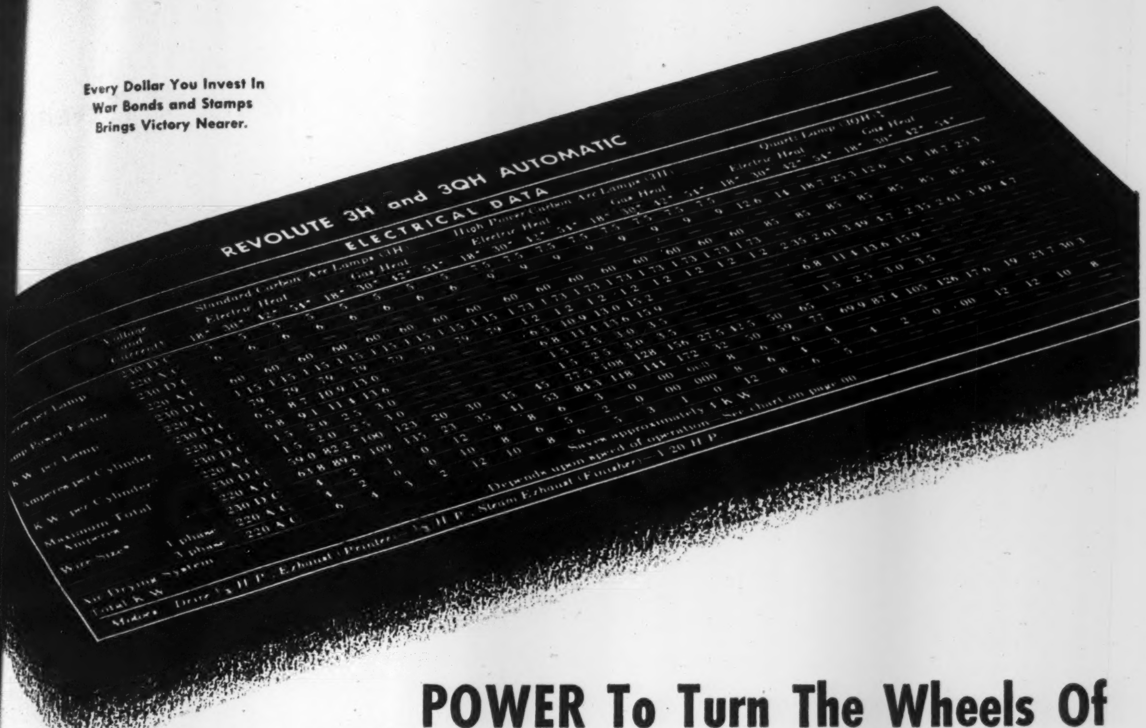
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ELECTRICAL DATA

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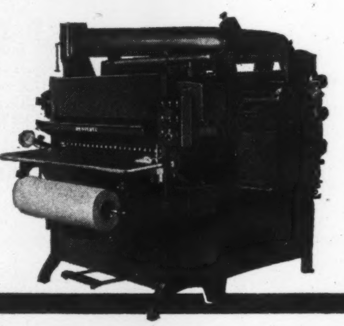
POWER To Turn The Wheels Of War Production

MATERIALS For The Tools Of War

make your Blueprints on Revolutes



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Depreciation Schedule—U. S. Bureau of Internal Revenu

In January 1942 the U. S. Bureau of Internal Revenue revised its 1931 schedule of probable useful life and depreciation rates. Items of direct interest to civil engineers and contractors are shown in revised Schedule "F", and include those quoted in the following list. The schedule reveals the probable useful life in years. Annual depreciation rates are not given, inasmuch as they are considered to be on a straight-line basis. For example, on an item having a probable useful life of ten years, the annual depreciation rate is 10 percent; for an item having a probable useful life of 25 years, the annual depreciation rate is 4 percent, etc.

BUILDINGS

	Est. Total Life, Years	Composite rate (percent) Type of construction Good	Average	Cheap
Apartments	50	2½	2½	8
Banks	67	2	2	2½
Dwellings	60	2	2½	3
Factories	50	2¼	2½	3
Farm buildings	60	2	2	2½
Garages	60	2	2½	3
Grain elevators	75	1½	2	2½
Hotels	50	2½	2½	3
Loft buildings	67	2	2	3
Machine shops	60	2	2½	3
Office buildings	67	2	2½	3
Stores	67	2	2	2½
Theaters	50	2½	3	3½
Warehouses	75	1½	2	2½

BUILDING EQUIPMENT

	Years
Air conditioning:	
Air conditioning systems—	
Large—over 20 tons	20
Medium—5 to 15 tons	15
Small—under 5 tons	10
Air washer. (See Dehumidifier.)	
Compressors—	
Refrigerating	20
Air for pneumatic controls	20
Condensers—	
Shell and tube	20
Double pipe	20
Evaporation	15
Coolers, water—tank and coil or shell and tube	20
Dehumidifier	10
Drums, purge or surge	20
Ducts and other sheet metal work.*	
Fans	15
Filters, air, oil, self-cleaning	20
Dry cleanable	10
Gauges	15
Grilles and registers—	
Anemostats	20
Grilles and registers—	
Wall type	20
Ceiling	20
Window units	15
Placques	20
Santrols.*	
Heaters—	
Boiler, oil burner and tank	20
Booster heaters	20
Electric heaters	15
Finned tube heaters, steam water cleanable tube	20
Preheaters and reheaters	20
Water heaters, open or closed type	20
Insulation—	
Cork, cold pipes and tanks	20
Magnesia, hot pipes	15
Wool felt	20
Asbestos	15
Louvres and screens, fresh air—	
Copper	25
Steel	15
Manometers	15
Motors—	
Synchronous and exciter set	20
Induction, indoor	20
Induction, weatherproof for outdoor	20
Piping, refrigerant and other	20
Pumps—	
Chilled water	20
Condenser water	20
Condensate	20
Dehumidifiers	22
Evaporative condenser	15
Sump	25
Well	25
Receivers, refrigerant	25
Regulators, suction or static pressure	5
Silicia gel beds	15
Spray pond	15
Switchboard, electric panel	20
Thermometers, room type or recording	15
Tower, cooling	15
Valves—	
Relief	20
Automatic expansion and by-pass	5
Solenoid	15
Water regulating	20
Ammeters	15
Clocks	15
Clocks, watchman	15
Compressors, air and vacuum	20
Electric clock systems:	
Clocks, time	20
Conduits, fittings and wiring. (See lighting systems)	
Motors and generators	20
Switch equipment—	
Boxes.*	
Switch parts	20
Elevators:	
Freight	25
Passenger	20
Fire equipment:	
Fire alarm systems	25
Movable equipment	20
Sprinkler system.*	
Guards, machine	25
Heaters, electric	10
Heaters, gas	15
Heating systems:	
Boilers and furnaces	20
Burner equipment—	
Gas	16
Oil	10
Radiators	25
Lighting systems:	
Conduits and fittings.*	
Wiring	20
Fixtures	15
Miscellaneous facilities:	
Awnings	5
Doors, louvre, ventilating	15
Incinerators	14
Safes and vaults.*	
Screens, window	10
Shades	5
Venetian blinds	8
Plumbing:	
Faucets and flushing valves	15
Bath tubs, lavatories, toilet bowls, etc	25
Pipes—	
Brass or copper.*	
Iron, cold-water	25
Iron, hot-water or steam	20
Sewer, cast-iron or vitrified.*	
Plumbing: (*cont'd*)	
Valves—	
Brass body, water or steam.*	
Iron body, water or steam	20
Pumps:	
Suction, pressure and sump	13
Roofs:	
Asbestos	25
Asphalt and tar (prepared)	15
Galvanized iron—	
Light or cold dipped	15
Heavy or hot dipped	20
Tar and gravel (5-ply)	20
Tarred felt	10
Copper, slate, tile, tin.*	
Starters, electric	20
Switchboards, electric	25
Tanks and vats, water:	
Metal	25
Wood	15
Telephone equipment:	
Conduits and fitting.*	
Wiring and fixtures	20
Tools, small, miscellaneous	5
Transformers	25
Trucks, conveyance (within building)	10
Trucks, lift	15
Voltmeters	15
Welfare equipment:	
Athletic	10
Cafeteria	10
Hospital and first aid	10
Police and fire	10
Wells and well pumps	25

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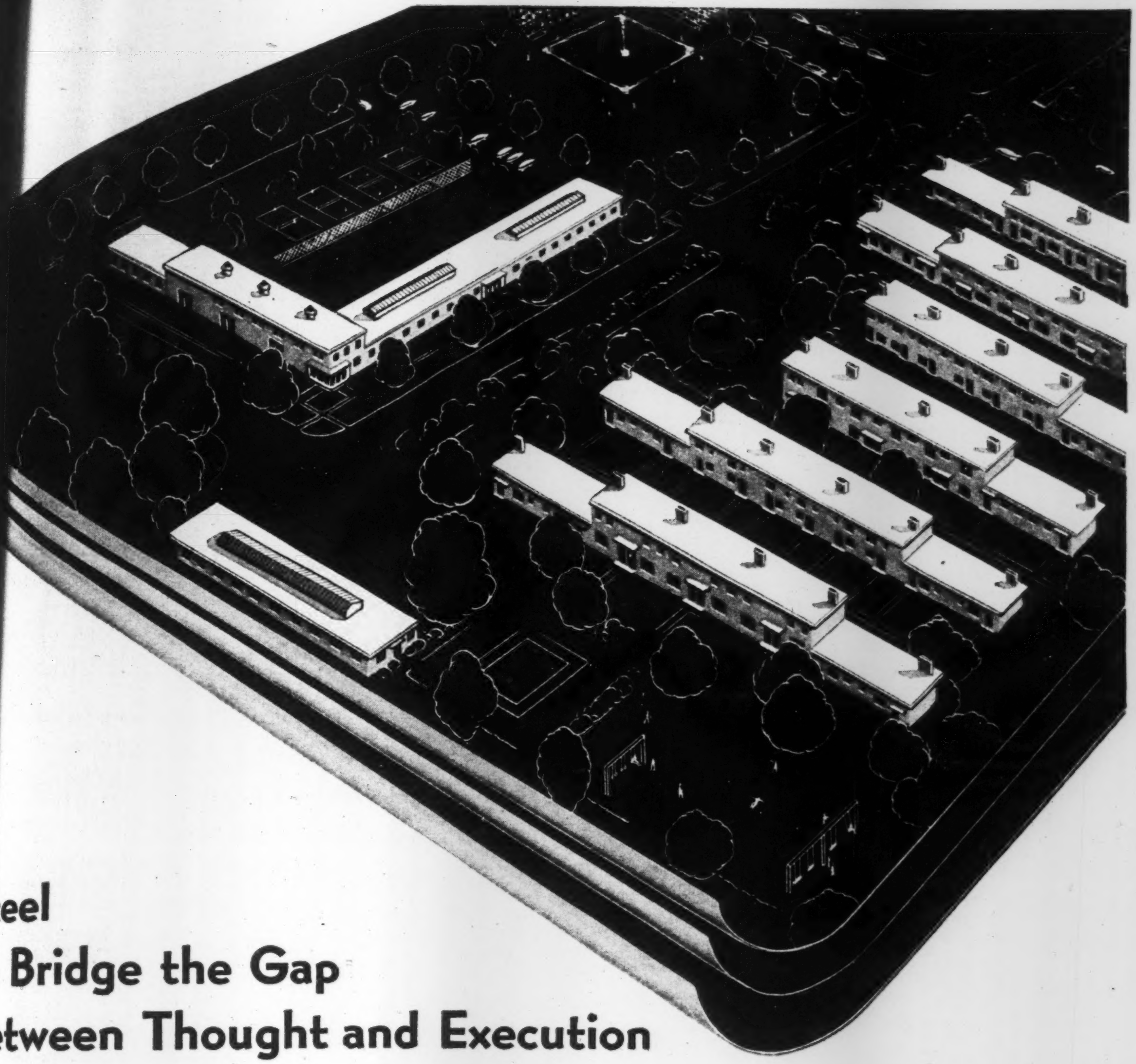
*Life of building.

CONSTRUCTION EQUIPMENT

	Years
Automobiles:	
Light	2
Medium	3
Heavy	5
Backfillers, power:	
Light	3
Medium	5
Heavy	6
Tractor	5
Barges:	
Steel	30
Wood	25
Batcher plants:	
All steel, demountable	10
Steel frame, wood bin	10
Stationery	14
Wood frame and wood bin	7
Batch, measuring devices	4
Benders, bar	5
Bending blocks	10
Bending machines:	
Angle	15
Pipe	10
Rail	10
Bins:	
Steel, concrete	6
Steel	12
Wood	8
Bin frames, steel	6
Blacksmith shop outfits, portable	4
Blocks, pulley, differential	6
Blowers, mechanical	10
Boats:	
House	20
Motor	8
Boilers:	
Upright	7
Locomotive	15
Stationary	20
Borers (wood), portable	3
Boring apparatus, test	10
Boxes, mortar and batch	3
Brakes:	
Bending	10
Cornice (sheet metal)	22
Breakers, pavement, pneumatic	3
Buckets:	
Cableway	6
Clamshell	6
Concrete	5
Elevator	5
Orange peel	6
Bail, pivot turnover	5
Scraper or drag line	6
Buggies:	
Concrete	3
Timber	3
Building, job office or storage. (Life of job)	
Bulldozers:	
Gradebuilders	8
Tractor	4
Bunkers, stone portable, with screens	6
Burner equipment, gas and oil	12
Cables, wire	4
Cableways, cable only	3
Cableway carriage	5
Camping equipment	
Capstans, electric	
Cars:	
Ballast spreader	
Batch box, steel	
Boarding and tool	
Concrete	
Derrick, bridge	
Dump, steel	
Dump, wood	
Flat, steel	
Flat, wood	
Hand	
Hopper	
Scale	
Skip hoist	
Tank	
Carts, concrete	
Carts, tool (steel)	
Cement gun machines	
Chains:	
Hawsers and lines	
Power, transmission	
Channelers, rock	
Chipping and calking tools, pneumatic	
Chutes, concrete, gravity	
Clamps, column form	
Cleaning machine for exterior of building, steam or sand	
Compressors:	
Belt driven	
Electric, portable	
Gasoline, portable	
Motor-truck unit	
Steam portable	
Concrete machines, pneumatic	
Concrete mixers:	
Electric	
Gasoline, 3½s, 5s, 7s	
Gasoline, 10s, 14s	
Gasoline, 21s, 28s	
Paving, gas	
Paving, steam	
Steam	
Truck mounted	
Controllers, motor	
Conveyors:	
Belt, elevating—	
Portable	
Stationary	
Bucket	
Cable—	
Drag	
Monorail	
Chain, portable	
Portable	
Scraper	
Cranes:	
Bridge and cantilever	
Crawler—	
Electric—	
2½, 5 tons	
10, 15 tons	
20 tons and over	
Gas—	
2½, 5 tons	
10, 15 tons	
20 tons and over	
Locomotive gas	
Steam—	
2½, 5 tons	
10, 15 tons	
20 tons and over	
Locomotive	
Dock or wharf, traveling	
Dragline	
Universal (gas, 2½ to 5 ton), mounted on 10-ton truck	
Craneways:	
Steel	
Wood	
Crushers, rock:	
Portable	
Stationary	
Cutters:	
Bar, power	
Corrugated iron, hand	
Cutting and welding outfits, portable	
Davits	
Derricks:	
Boat	
Circle swing, hand	
Crab—	
Hand	
Power	
Guy—	
Steel	
Wood	
Stiffleg—	
Steel	
Wood	
Diggers, clay, pneumatic	
Drag lines:	
Electric—	
½, ¾ cubic yard	
1, 1¼, and 1½ cubic yards	
2 cubic yards and over	



teel
Bridge the Gap
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T of Stran-Steel's wartime research and developments, el will emerge as a new medium of expression—flexible the mind of man, and adaptable to all his concepts. It l take shape tomorrow in fresh and varied forms of chitecture, where time-worn limitations are overcome achieve new scope and efficiency in building.

less important than the developments which Stran-eel has already made is the vast fund of technical owledge that is being acquired. Stran-Steel's broad gineering background will serve the construction indus- well in days to come.

STRAN STEEL

DIVISION OF GREAT LAKES STEEL CORPORATION
1130 PENOBSCOT BUILDING, DETROIT, MICHIGAN

NIT OF NATIONAL STEEL CORPORATION

Drag Lines: (cont'd)	Years
Gasoline—	
½, ¾ cubic yard	5
1, 1¼ and 1½ cubic yard	9
2 cubic yards and over	12
Steam—	
½, ¾ cubic yard	6
1, 1¼ and 1½ cubic yards	10
2 cubic yards and over	12
Dredges:	
Clamshell	16
Dipper	8
Hydraulic	20
Pipe	10
Drill boats	12
Drill points, well	5
Drills:	
Airdrifter	3
Electric or pneumatic, hand, for wood or metal	5
Hand, electric	3
Rock, electric	3
Jackhammer	3
Steam	5
Traction, well	7
Tripod	7
Tunnel carriage	5
Well	10
Drums for oil (steel)	10
Elevators:	
Bucket, stationary	6
Cage (steel tower)	5
Engines:	
Blowing	12
Fire	7
Gas	10
Marine	20
Oil	20
Plumbing	14
Steam	11
Excavators:	
Cableway, complete	4
Trench, gasoline—	
7-foot depth	6
12-foot depth	6
18-foot depth	8
Trench, steam—	
7-foot depth	8
12-foot depth	8
18-foot depth	10
Trench, vertical boom	5
Wheel or ladder type	5
Extinguishers, fire	3
Fans, exhaust	15
Finishing machines	4
Floats, bridge (steel)	5
Forges, gas or oil burning	10
Forms:	
Concrete (metal pans)	5
Concrete, supports, adjustable	4
Steel, for—	
Pavements	4
Pipes	3
Roads	4
Tunnels and conduits	4
Walls	5
Furnaces, metal melting:	
Coal fired	10
Electric	12
Gas or oil	7
Generator sets:	
Steam engine	12
Turbine, headlight or floodlight	4
Gin poles (steel)	10
Gradebuilders (bulldozers)	8
Graders:	
Blade, road—	
7, 8 foot blade	4
9, 10 foot blade	5
over 10-foot blade	8
Elevating	8
Form, subgrade planers	6
Rooters, wheel	5
Grinders:	
Metal surface	15
Saw filers and setters	14
Surface, concrete	4
Hammers:	
Electric	3
Pneumatic riveting	3
Harness	4
Heaters, asphalt, tar, and pitch kettles	4
Helmets, gas and diving suits and equipment	10
Hoists:	
Air, electric, or steam	8
Chain	6
Electric monorail or post	5
Gas	6
Hand power	8
Slew—	
Electric	8
Steam	12
Holders on pneumatic	4
Horses	5
Hose:	
Fire, linen or rubber lined cotton	5
Metal, flexible	10
Oil	5
Reel or cart	10
Rubber, air, steam or water	10
Inundators, batch	4
Inland craft:	
Graders, hydraulic	7
Quarter boats	10
Jacks:	
Hydraulic	8
Rail	25
Rachet	8

Jacks: (cont'd)	Years
Screw	5
Steamboat, push and pull	3
Jibs, steam	17
Jointers, bench, electric, steam or gas	5
Ladders:	
Rope, wood rungs	2
Steel	3
Ladles, metal	7
Lathes:	
Metalworking	15
Woodworking	17
Launches, gasoline	10
Levee construction equipment:	
Drag lines	8
Shovels	8
Tower excavators	12
Life-saving equipment	10
Light plant	4
Lighters	22
Loaders, bucket:	
Crawler	5
Portable	5
Stationary	6
Locomotive battery	4
Locomotives, industrial:	
Diesel	10
Electric	16
Gas—	
Up to 10 tons	8
10 to 20 tons	15
Over 20 tons	20
Steam—	
Up to 10 tons	8
10 to 20 tons	18
Over 20 tons	20
Locomotives, standard gage	30
Magnets, lifting	15
Milling machines	15
Mixers; portable mortar	3
Less than ½ cubic yard	6
Over ½ cubic yard	8
Caterpillar	8
Motors:	
AC and DC—	
Large	12
Medium	10
Small	8
Hydraulic	5
Pneumatic	5
Mowers, right of way	5
Mules	5
Pile drivers:	
Barge	8
Railroad outfits	10
Steam, on skids	10
Track	12
Pile hammers, steam or air:	
Heavy	10
Light	4
Medium	5
Pipe:	
Black or galvanized	4
Wood	5
Wood and steel combination	6
Pipe lines and fittings, for floating dredges	10
Pit and quarry plants	6
Planers:	
Metalworking	15
Woodworking	20
Plows:	
Furrow	3
Rooter	6
Pontoons	20
Presses, drill	12
Pumping units:	
Electric—	
Centrifugal	6
Diaphragm	6
Piston	6
Gas—	
Centrifugal	6
Diaphragm	6
Highway contractor's pump	4
Piston	5
Steam, centrifugal	10
Pumps:	
Air lift	10
Centrifugal	6
Humdinger	6
Impulse	6
Hydraulic	15
Oil	10
Steam piston unit	6
Testing for pipe lines	15
Punches, hydraulic	20
Punches for steel, power	15
Racks, storage, for pipe and steel:	
Steel	20
Wood	15
Rails, steel	10
Razing equipment, for buildings	8
Reamers:	
Electric	3
Pneumatic	3
Riveters, pneumatic	5
Rollers:	
Concrete finishing (steel)	10
Road, gas	10
Road, steam	10
Rolls, ridge	5
Rowboats	6
Sand-blast outfits	10
Sawmills, portable	10
Saws:	
Band, cut-off and rip, power	10
Hand, Electric and pneumatic	3

	Years
Saws and woodworkers.	
Steel frames	10
Wood frames	5
Scales, large, track and wagon	20
Scarifiers:	
Attachments	4
Blocks, steerable	5
Drag, all steel	4
Grader type	4
Scows	25
Scows, dump	25
Scrapers:	
Blade, carryall	6
Fresno or Morman	2
Rotary	4
Slip	2
Wheel	5
Screens and bunkers, for gravel pits only	5
Screens, revolving	6
Sharpeners, drill	8
Shears, for steel, hand	10
Shores, adjustable	4
Shovel attachments, for cranes	6
Shovels:	
Electric or gasoline, crawler or wheel—	
½, ¾ cubic yard	5
1, 1¼, 1½ cubic yards	6
2 cubic yards and over	8
Steam, crawler or wheel—	
½, ¾ cubic yard	7
1, 1¼, 1½ cubic yard	8
2 cubic yards and over	10
Railroad, steam	10
Tunnel	4
Spouting plants, complete, concrete	4
Spraying equipment, paint	12
Spreaders, stone:	
Hopper wagon	5
Steel box	5
Steamers, paddle wheel	30
Switches:	
Portable	4
Stationary	5
Tampers, backfill, pneumatic	3
Tamping machines	10
Tanks:	
Gasoline, storage	6
Relay	6
Water or air, storage (steel)	10
Water storage (wood)	14
Tarpaulins and tents	3
Threading and cutting machines, pipe	10
Ties:	
Steel	12
Wood	6
Tongs, chain	4
Towers:	
Cableway—	
Steel	6
Wood	3
Steel boom with counterweights	5
Tracks, industrial, portable	6
Tractors:	
Electric—	
3-ton	3
5-ton	5
10-ton	6
20-ton	8
Gas or steam—	
3-ton	4
5-ton	6
10-ton	8
20-ton	10
Trailers:	
Dump—	
Steel	10
Wood	10
Platform, wood	4
Drop platform, heavy duty	5
Transformers, car	10
Trenching machines. (See Excavators.)	
Trucks, auto:	
General purpose or dump—	
½-¾ cubic yard	3
1-1¾ cubic yards	5
2 cubic yards and over	8
Tugs, screw-propelled, steam or gas	25
Turntables, industrial railway	4
Vises	5
Wagons:	
Dump—	
Steel	6
Wood	6
Farm—	
Heavy	10
Light	10
Road oilers, tank, steel	10
Tank or sprinkler—	
Steel	10
Wood	8
Washers, gravel	3
Welding outfits, acetylene or electric	10
Wheelbarrows	2
Winches, electric and pneumatic	10
Wire and cables:	
Electric	6
Flexible, steel armored	8

BRIDGES

Concrete and steel or masonry, large	100
Concrete and steel or masonry, small	75
Steel, heavy	50
Steel, light	40

WATER SUPPLY

Impounding dams
Springs and wells
Infiltration galleries and tunnels
Collecting conduits and reservoirs
Mains, cast iron
4-inch and less
6-inch
8- to 10-in
12-inch and over
Settling basins
Coagulating basins
Filters
Steam engines
Internal combustion engines (D
type)
Pumps
Stand pipes
Meters
Hydrants
General office equipment
General shop equipment
General store equipment
Laboratory equipment

ELECTRIC UTILITIES

Steam Production

Structures and improvements
Boiler plant equipment
Engines and engine driven generat
Turbo-generator units
Accessory electric equipment
Miscellaneous power plant equipme

Hydraulic Production

Structures and improvements
Reservoirs, dams and waterways
Waterwheels, turbines and generators
Accessory electric equipment
Miscellaneous power plant equipment
Roads, railroads and bridges

Transmission Plant

Structures and improvements
Station equipment
Towers and fixtures
Poles and fixtures
Overhead conductors and devices
Underground conduit
Underground conductors and devices
Roads and trails

Distribution Plant

Structures and improvements
Station equipment
Storage battery equipment
Poles, towers and fixtures
Overhead conductors and devices
Underground conduit
Underground conductors and devices
Line transformers
Services
Meters
Installations on customers' premises
Street lighting and signal systems

ARTIFICIAL GAS

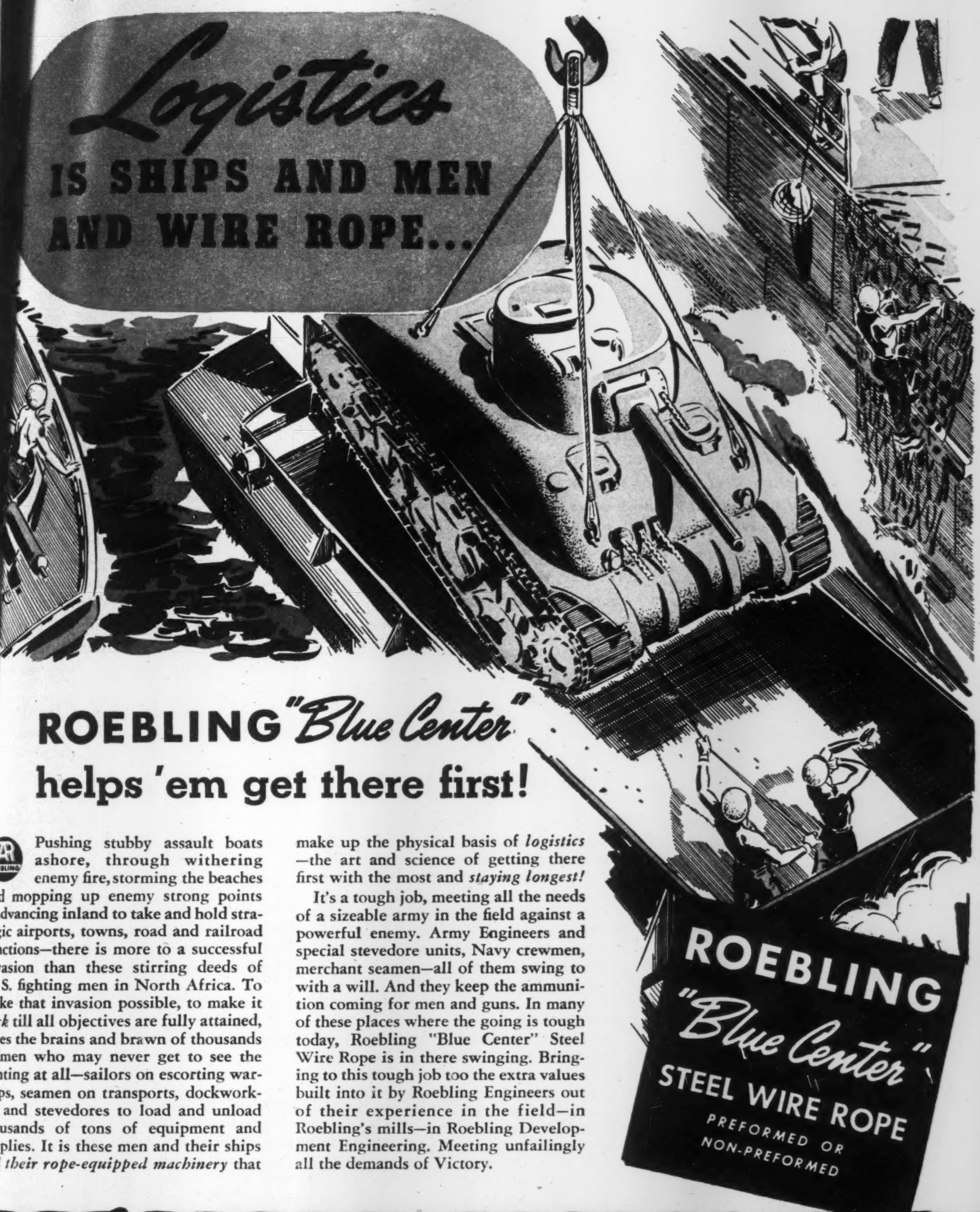
Production Plant

Structures and improvements
Boiler plant equipment
Other power equipment
Benches and retorts
Coke ovens
Producer gas equipment
Water gas generating equipment
Petroleum gas equipment
Other gas generating equipment
Coal, coke, and ash handling equipment
Gas reforming equipment
Purification equipment
Residual refining equipment
Other production equipment

Distribution Plant

Structures and improvements
Mains
Cast iron pipe—
4 inches and less
6 inches
8 to 10 inches
12 inches and over
Steel pipe—
4 inches and less
5 to 7 inches
8 inches and over
Wrought iron pipe—
¾ inches to 1½ inches
2 to 2½ inches
3 to 6 inches
8 to 10 inches
12 inch and over
Pumping and regulating equipment
Services
Meters
Meter installations
House regulators
House regulator installations
Other property on customers' premises
Other distribution system equipment

Logistics IS SHIPS AND MEN AND WIRE ROPE...



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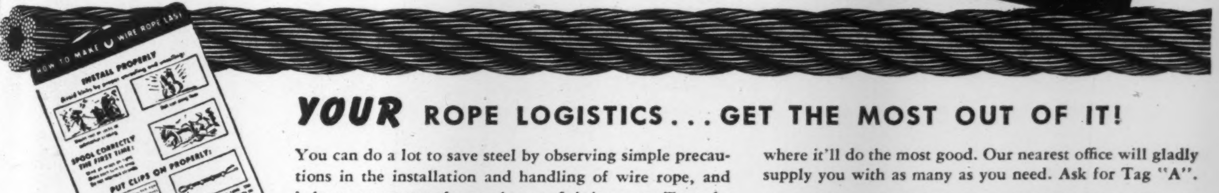
Pushing stubby assault boats ashore, through withering enemy fire, storming the beaches and mopping up enemy strong points—advancing inland to take and hold strategic airports, towns, road and railroad junctions—there is more to a successful invasion than these stirring deeds of U. S. fighting men in North Africa. To make that invasion possible, to make it *stick* till all objectives are fully attained, takes the brains and brawn of thousands of men who may never get to see the fighting at all—sailors on escorting warships, seamen on transports, dockworkers and stevedores to load and unload thousands of tons of equipment and supplies. It is these men and their ships *and their rope-equipped machinery* that make up the physical basis of *logistics*—the art and science of getting there first with the most and *staying longest!*

It's a tough job, meeting all the needs of a sizeable army in the field against a powerful enemy. Army Engineers and special stevedore units, Navy crewmen, merchant seamen—all of them swing to with a will. And they keep the ammunition coming for men and guns. In many of these places where the going is tough today, Roebling "Blue Center" Steel Wire Rope is in there swinging. Bringing to this tough job too the extra values built into it by Roebling Engineers out of their experience in the field—in Roebling's mills—in Roebling Development Engineering. Meeting unfailingly all the demands of Victory.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INSTALL PROPERLY
SPOOL CORRECTLY THE FIRST TIME!
PUT CLIPS ON PROPERLY!

YOUR ROPE LOGISTICS . . . GET THE MOST OUT OF IT!

You can do a lot to save steel by observing simple precautions in the installation and handling of wire rope, and help conserve rope for use by our fighting men. To make the job even easier, Roebling has prepared a handy tag—yours for the asking—to fasten right to your machinery where it'll do the most good. Our nearest office will gladly supply you with as many as you need. Ask for Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

Cost Comparison of Wood, Steel and Concrete Warehouses

Arthur F. Comstock
Consulting Estimator,
New York, N. Y.

***Contents in Brief**—Published analyses of contractor's costs on building construction under lump sum contracts are rare. For this reason alone these data would make a valuable contribution to engineering literature. In addition are compared actual 1941 costs of structures identical in size, but built of wood, of steel and of concrete. These costs have increased from 1941 to 1943 in differing ratios until wood, steel, and concrete cost substantially the same per square foot. How much of this increase is in labor, how much in materials, is shown for each trade. The author, a widely experienced estimator, has checked subcontractors' cost changes in each trade. He also presents separate opinions of outstanding building contractors respecting cost increases on similar work.*

TWO OBJECTIVES guided the writer in the preparation of this article—to present a cost-analysis by trades of large one-story warehouses of three types, i.e. wood frame, steel frame and concrete frame, all recently built under the war program by lump-sum contract; and to give, item by item, an accurate record of the increases in these costs which have occurred in the two-year period, January 1, 1941 to January 1, 1943. Each building is of identical size in plan, with the same kinds of exterior walls, floor on ground, windows, doors and mechanical work—and all three are assumed to be constructed at the same time under the same wage scales and material prices, construction beginning January 1, 1941. The costs given were actually achieved on similar work at the times and under the conditions specified.

Final costs of all three buildings for both years are arranged in Table 4 for easy comparison, while the prevailing wage rates, basic material prices and specification digest are indicated in Tables 1, 2, and 3.

Selection of January 1, 1941 as the starting date was made because the writer believes, and he found this opinion generally to be shared by others, that construction costs at that time were still largely on a pre-war level and unaffected by priorities, overtime working hours or drastic labor shortages. The second date, January 1, 1943 was taken in an endeavor to show the up-trend or increase in costs resulting from war conditions. It should be borne in mind that we are here dealing only with conditions in the Middle West, and also that the work was done under lump-sum contracts.

In choosing the size of building, i.e., 181 ft. 8 in. wide by 1,242 ft. long, it was intended to typify the larger warehouses as presently constructed, so that repetition of shop and field operations would reflect minimum costs. Two buildings were considered to be constructed under one contract for each of the three types, one building following the other in field execution.

It may naturally be difficult for the proponents of each of the three types to believe that the writer could faithfully present these costs without some conscious or unconscious effort to

TABLE 1. WAGE RATES
Jan. 1, 1941 compared with Jan. 1, 1943
Showing percentage of increase in each trade

	Jan. 1, 1941 per Hour	Jan. 1, 1943 per Hour	Increase 1943 over 1941 Percent
Bricklayers	$1.50	$1.75	16.7
Bricklayers Helpers	.90	1.00	11.1
Carpenters	1.25	1.50	20.0
Cement Finishers	1.25	1.38	10.4
Electricians	1.40	1.50	7.1
Engineers, Hoisting	1.30	1.40	7.7
Glaziers	1.25	1.30	4.0
Ironworkers, Structural	1.50	1.65	10.0
Laborers, Common	.70	.75	7.1
Painters	1.25	1.38	10.4
Plumbers	1.40	1.50	7.1
Power Shovel Operators	1.50	1.65	10.0
Roofers, Composition	1.25	1.35	8.0
Steamfitters	1.40	1.50	7.1
Sheet Metal Workers	1.25	1.50	20.0
Truck Drivers	.75	.80	6.7
Average of 16 trades =			10.2*

* Percent increase.

TABLE 2. BASIC MATERIAL PRICES
Jan. 1, 1941 compared with Jan. 1, 1943
Showing percentage of increase

	Unit	Jan. 1, 1941	Jan. 1, 1943	Increase 1943 over 1941 Percent
Cement, Portland, Bulk, on cars	Bbl.	$2.00	$2.00	0
Cement, High Early Strength, Bulk, on cars	Bbl.	2.50	2.50	0
Cement, Mason's, Paper, delivered	Bbl.	2.00	2.00	0
Gravel, Concrete } by truck, 1 yd. batches	C.Y.	1.75	1.85	5.7
Sand, Concrete }		....	....	....
Sand, Brick, delivered by truck	C.Y.	2.15	2.15	0
Lumber, Forms—1x6, 1x8, 2x4, #2 Y.P	M	46.00	53.00	15.2
Lumber, 2x6, D.&M., #1 Common Fir	M	50.00	57.00	14.0
Lumber, 2x4, 2x6, 2x8, #2 Y.P	M	47.00	54.00	14.9
Lumber, 3x4, 3x6, 4x6, 6x6, 8x8, 6x12, #1 Fir	M	58.00	65.00	12.1
Plywood, 5/8", fir, sealed edges	S F.	0.115	0.135	18.2
Concrete Blocks, 8" Hollow	S. F.	0.10	0.10	0
Concrete Blocks, 4" Hollow	S. F.	0.08	0.08	0
Expansion Joint, fiber, ½" x 4½"	L. F.	0.033	0.033	0
Reinforcing Steel, f.o.b. cars at site	T.	63.00	63.00	0
Structural Steel, f.o.b. cars at site	T.	75.00	75.00	0
Miscellaneous Iron & Steel, delivered	Lb.	0.045	0.051	14.7

prove that one was inherently more expensive than another. But, if they will examine the evidence as here presented, they may be ready to admit that the costs in all three types are about as low as have been attained on comparable work. In any event the costs shown are actual field costs.

The fact that concrete and wood have been more commonly used than has steel under the impetus of war conditions is doubtless due to the dire necessity of conserving steel for more vital needs, such as ships. Or perhaps speed of construction has dictated the choice, rather than any inherent advantages or disadvantages of one or the other type. Accessibility of local materials also has been a key factor in some instances.

The writer is well aware, from over thirty-five years experience in dealing with construction costs, that any cost is applicable only to a particular set of conditions, in a particular place and at a particular time. Still, the wage rates and material prices for the location chosen are fairly representative, by mere coincidence, of a number of other areas.

The site chosen, in the Middle West, is far enough from metropolitan centers to be immune from the higher costs frequently caused by peak wage rates, lowered efficiency, inadequate housing, frequent strikes or other unfavorable cost conditions associated with such areas. There is a railroad siding at the site, and a medium-size city is close by, so that no feeding or housing of workmen had to be provided. Public transportation for the men was adequate. Priorities were obtainable for the necessary materials.

Much time and effort has been

TABLE. 3. SPECIFICATION DIGEST AND LIST OF ITEMS

For wood, steel and concrete warehouses

1. EXCAVATION & GRADING. Site is level, no clearing or wrecking required. One foot average cut and fill balanced over building area. Concrete building has 7-ft. x 11-ft. reinforced interior footings, 4 ft. deep, clam shell excavation. Hand excavation for 12-in. x 18-in. grade beams, backfill, grade for floor on ground. Steel and wood buildings have same items but different size of footings. Allowable soil pressure 4000 lb. per sq. ft.

2. CONCRETE FOUNDATIONS. Spread footings, grade beams under walls, forms, 2500-lb. concrete, tests, set anchor bolts and grout base plates for steel building, plant, insurance and reinforcing steel for concrete building only.

3. STRUCTURAL CONCRETE. Columns, beams, spandrels, inverted beams, brackets, column heads, 3500-lb. concrete, forms, portable centering and ⅝-in. plywood deck with track, wheels, fittings and appurtenances. Reinforcing steel and accessories, flashing strips, Roberts and Schaeffer Patents, tests, skylight curbs, expansion joints, high-early-strength cement for roof; heating and protection in freezing weather, trowel roof deck, vibrating cross-girders, patch exposed concrete, roof saddles, plant, insurance.

4. STRUCTURAL STEEL. Unloading and hauling (siding at site). Trusses, columns, purlins, sag rods, bracing, erecting and riveting, furnishing anchor bolts, inspection, 1 field coat of paint.

5. STRUCTURAL WOOD. For steel building: 2-in. T. & G. roof deck, 2x4 nailers, blocking and fascia. For wood building: 2-in. T. & G. roof deck, 6x12 purlins, struts, blocking, fascia, nails, bolts, rings, washers and fittings, columns, trusses, splices.

6. CEMENT FLOOR ON GROUND. 1-in. sand fill under floor, 5-in. concrete for all 3 types of building, expansion joints, monolithic trowelled finish, protection, plant, insurance.

7. MISC. IRON & STEEL. Door frames and angle sills. Lintels for steel and wood building. All misc. iron and steel is delivered only and set by concrete contractor or carpentry contractor.

8. CONCRETE BLOCK MASONRY. 8-in. hollow stone concrete blocks in exterior and fire walls ⅜-in. joints struck both sides. Furnish and set precast concrete window sills, 4-in. concrete block partitions around toilet rooms, masons cement mortar, 3 oz. paper-backed copper under exterior walls, clean and point, scaffold, plant, insurance. (Same for all 3 buildings, except height of walls.) Expansion joints for concrete building.

9. ROOFING & SHEET METAL. 3-ply asphalt on concrete (4-ply on wood) 10-year guarantee, 15-lb. felt, smooth finish. For concrete building: 16-oz. copper cap flashing at beams above roof, expansion joints, flashings at conductor heads. For steel and wood buildings: Galv. copp.-bg. steel flashing. Exterior downspouts for all three buildings, hanging gutter for wood and steel buildings.

10. SKYLIGHTS & VENTILATORS. For concrete building: 36-in. dia. 20-ga. steel ventilators with bird screen, damper and chain to 6 ft. above floor, primed 1 coat. Stationary hip skylights, puttyless construction, 18-ga. galvanized copper-bearing steel, metal gable-ends. (One-half number of skylights or 30 have heat valves, chain operated). ¼-in. ribbed wire glass. Skylight support is light angle frame (on 8-in. concrete curbs). 2-way slope, curb flashing of 24-ga. galv. copp.-bg. steel. Same for wood and steel buildings.

11. METAL TOILET PARTITIONS. Galvanized, flush, Government type, with hardware and doors, baked enamel finish. Same for all 3 buildings.

12. ROLLING STEEL DOORS. Standard, hand-operated for exterior and fire walls, primed 1 coat. Same for all 3 buildings.

13. KALAMEIN & TIN CLAD DOORS. Underwriters' Class A label Kalamein, 1¾-in. thick, frames by others. Underwriters' Class A label 3-ply Tin Clad, frames by others. All doors primed 1 coat. Hardware included. Same for all 3 buildings.

14. STEEL SASH & CAULKING. Security-type, including insect screens. Caulking around sash and exterior door frames. Same for all 3 buildings.

15. GLASS & GLAZING. DSA glass in steel sash. Same for all 3 buildings.

16. PAINTING. 2 coats lead and oil: steel sash, miscellaneous iron and steel, structural steel and metal doors, downspouts. No painting of walls or ceilings.

17. RADIAL BRICK CHIMNEY. Standard 62 ft. x 2-ft. 9-in. inside top dia. Same for all 3 buildings.

18. HEATING. Only one 120-ft. section (about 1/10 of building) is heated, 0° outside to 50° inside. Boilers in building. Unit heaters.

19. PLUMBING & DRAINAGE. 45 fixtures at 5 locations (9 per battery) 240 ft. apart; no lines outside of building. Wrt. iron interior downspouts, roof drains, cast iron pipe below ground. Same for all three buildings.

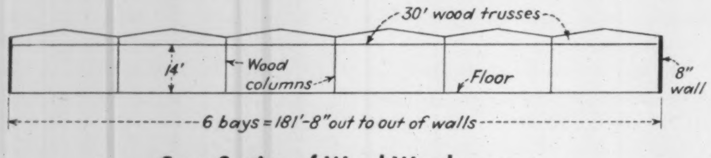
20. ELECTRIC WIRING & FIXTURES. Transformer vault below ground. Simple wiring job, conduits embedded in concrete roof slab for concrete building, exposed on ceiling of wood and steel building. Mazda lamps suspended by drop cords. Main ducts suspended below ceiling. Service by others.

21. PLANT. Each trade includes its own plant charges.

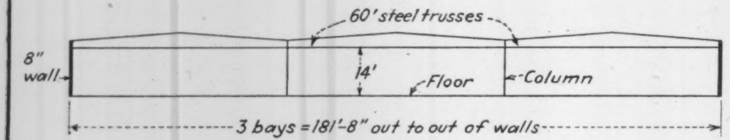
22. INSURANCE. Includes only fire, windstorm and sub-contractors' contingent. Each trade carries its own workmen's compensation, public liability, social security and unemployment insurance.

23. JOB OVERHEAD (GENERAL CONDITIONS). Administration including project manager, superintendent, assistant superintendent, engineering, drafting and blueprints, timekeeper, material clerk, cost accountants, expediting, watchmen, water boys, temporary roads, field office and sheds, maintenance and heating of office, engineer's office, telephones and telegraph, stationery, furniture and supplies, temporary runways and ladders, temporary water lines, temporary toilets and maintenance, cleaning and removal of rubbish, washing windows, final cleanup at completion, progress photographs, traveling expenses, auto hire, special taxes.

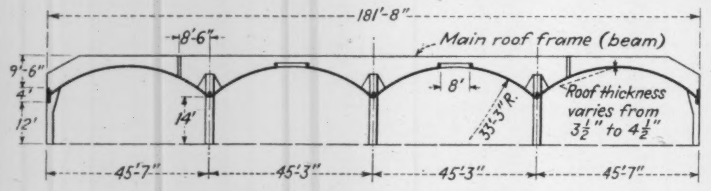
25. CONTRACTOR'S FEE. Includes general office overhead and profit. Lump-sum contract.



Cross Section of Wood Warehouse



Cross Section of Steel Warehouse



Cross Section of Concrete Warehouse

spent in an endeavor to present a thorough cost analysis of these buildings with sufficient supporting data to make possible comparisons with buildings in other localities and at other periods. Many general contractors and sub-contractors with recent experience on similar work have been consulted, and grateful acknowledgment is hereby made for their generous assistance.

Concrete warehouse

Costs cited for the concrete warehouse relate to a design using a thin barrel-arch roof, formed and poured with portable trussed centering, using ⅝-in. plywood deck forms with sealed edges, and by methods and plant similar to the arrangement described in *Engineering News-Record* of April 24, 1941, one pour consisting of the entire 4-bay width of building and a two-bay (80-ft.) length. Two end bays of 20 ft. each are cantilevered. Roof reinforcing is ⅜-in. and ½-in. bars bent in place.

The cross-bays, as shown in the accompanying illustration are approximately 45 ft., with roof supported by inverted girders carried on 2-ft. square columns and spread footings, with allowable soil pressure of 4,000 lb. per sq. ft. Longitudinal beams (spandrels) occur at exterior walls, which are of 8-in. hollow stone-concrete blocks, 12 ft. high. The windows are security-type steel sash, with precast concrete sills. Firewalls, also of 8-in. concrete block, divide the warehouse into 120-ft. sections. Roof drains occur at each column crosswise of the building and at 80-ft. intervals longitudinally. Lighting conduits for ceiling outlets (using drop-cord Mazda bulb lights) are embedded in the roof slab, but main electric ducts are suspended below the ceiling. Each 240 ft. section of building has a toilet room with 4-in. concrete block enclosing partition and metal toilet compartments, 3 urinals, 3 water closets, 3 lavatories and 1 slop sink. For further data see Table 3.

The concrete for work above grade is handled as follows: sand, gravel and high-early-strength cement are delivered by truck in one-yard batches, dry-mixed, to a paving mixer alongside the building. The mixer boom-bucket discharges into a hopper from whence a crane lifts 1-yd. bucket loads to a roof hopper. From the roof hopper concrete is delivered by hand buggies running on a track supported above the roof on steel bents. The work below grade, also floor on ground, is poured with paving mixer, using plain portland cement concrete. All concrete work was performed with one 10-hr. shift.

Skylights, 60 in all, constructed as specified in Table 3, occur in each of the two middle bays 40 ft. on centers, each 9 ft. 4 in. by 19 ft. 4 in. in plan.

Steel building

A skeleton cross section of the three-bay wide steel frame building with trusses in each bay is also shown in the accompanying illustration. Longitudinal bays are 20 ft. The steel averages 9 lb. per sq. ft. of floor. Walls, steel sash, doors, firewalls and concrete floor are identical with those of the concrete building as specified in Table 3, except exterior walls are 6 ft. higher since the walls of the concrete structure finish at the underside of the roof spandrel beam.

The roof deck is 2-in. wood on 2x4 wood nailers, which in turn are bolted to steel channel purlins 5 ft. on centers. The roofing is 4-ply asphalt, 2 nailed and 2 stuck, smooth finish. Electric conduit is exposed on the ceiling. Plumbing and partitions are identical with those in the concrete building. Skylights also are the same except for wood curbs. Wood saddles carry roof drainage to downspout heads at interior rows of columns. An alternate for using 1½-in. cement tile roof with cinder concrete saddles in place of the wood deck is shown at the bottom of Table 4, so that all wood is then eliminated from the steel building.

Wood building

The timber warehouse is a 6-bay wide wood frame building using 30-ft. trusses in each bay, with the same kinds of exterior walls, steel sash, doors, firewalls and concrete floor as described for the concrete building and as specified in Table 3. Longitudinal bays are 20 ft. The roof deck is 2-in. wood on 6x12-in. purlins, 5 ft. on centers. Roofing is 4-ply asphalt, the same as for steel building. Plumbing and partitions are the same as for the steel and concrete buildings. Skylights also are the same as for the steel building (60 in all), and set on wood curbs. Wood saddles conduct roof drainage to downspout heads.

Wood exterior walls were not adopted here because they are not considered by the writer as permanent enough nor secure enough against sabotage for the purposes of these buildings. This is not to deny however, that wood is a suitable material for exterior walls of many kinds of buildings.

Comment on Table 4

The most significant thing to the writer, concerning the results in Table 4, is the low cost of the concrete building. It is unusual for such a structure to be built substantially as cheaply as a steel frame building with wood roof. Such a result implies, of course, an efficient design, but more than that, and particularly noteworthy in these hectic times, it bespeaks an efficient concrete organization. The successful use of portable forms naturally was a major factor in producing such remarkably low costs.

Referring to the final percentage of increased costs of 1943 over 1941—19 percent for wood, 14 percent for steel and 15.7 percent for concrete, as shown at the bottom of Table 4—the writer asked a number of general contractors who have been doing much work of similar nature except that it has been on a fee instead of lump sum basis, to give their opinions as to what this increased cost percentage should be, based on their own experience. The opinions of six such contractors follow:

1. Middle Western Contractor	15 to 20%
2. New York Contractor	25%
3. New York Contractor	20%
4. New York Contractor	28%
5. New York Contractor	15%
6. Philadelphia Contractor	20%
Average opinion	21%

With a greater number of older and more experienced mechanics being drafted, there is now going on a more rapid deterioration in production efficiency than at any time since we entered the war. In choosing known values as a basis for estimating January, 1943 costs, the writer used experience of the late summer and fall of 1942 with allowance for anticipated labor increases and loss of efficiency up to January. In projecting costs into 1943, allowance should be made for accelerating loss in labor efficiency according to local conditions.

Rough carpentry labor costs, for example, particularly in regions adjacent to large cities but also in some remote areas, have varied all over the lot—even up to as much as 200 percent above the $40 figure used on the wood building in this article.

TABLE 4. COMPARISON OF COST OF WOOD, STEEL AND CONCRETE 1-STORY WAREHOUSES AS OF JAN. 1, 1941 AND JAN. 1, 1943

Showing also increases in costs of labor and materials by trades for this 2-year period (Cost is based on a lump-sum contract for 2 buildings of size given)

	WOOD BUILDING	STEEL BUILDING	CONCRETE BUILDING
Size of Building, Ft.	181′-8″ x 1242′	181′-8″ x 1242′	181′-8″ x 1242′
Size of Bays, Ft.	30′-3″ x 20′	60′-6″ x 20′	45′-5″ x 40′
Number of Bays	6 x 62 = 372	3 x 62 = 186	4 x 32 = 128
Girth of Building, Ft.	2,847	2,847	2,847
Area of Building, Sq. Ft.	225,530	225,530	225,530
Height of Building, Ft.	20	21	21
Height of Side Walls, Ft.	18	18	12
Cube of Building, Cu. Ft.	4,511,000	4,736,000	4,736,000
Construction Period, Mo.	(1 Bldg.) 3	(1 Bldg.) 4	(1 Bldg.) 4

% Mat.	% Lab.	No.	Trade	Cost Jan. '41	% Increase			Cost Jan. '43	Cost Jan. '41	% Increase			Cost Jan. '43	Cost Jan. '41	% Increase			Cost Jan. '43
					Mat.	Lab.	Total			Mat.	Lab.	Total			Mat.	Lab.	Total	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)
57	43	1.	EXCAVATION & GRADING	$5,900	10	10	10	$6,500	$7,200	10	10	10	$7,900	$7,700	10	10	10	$8,500
55	45	2.	CONCRETE FOUNDATIONS, (e) 500; (j)400; (0)700 CU. YD	5,400	6	30	16.8	6,300	4,400	6	30	16.8	5,100	8,400	6	30	16.8	9,800
55	45	3.	STRUCT. CONCRETE 6,100 CU. YD. for(o)	......	..	..	..	......	......	..	..	..	......	156,300	6	30	16.8	182,500
82	18	4.	STRUCTURAL STEEL 1010 TONS	......	..	..	..	......	90,900	0	35	5.3	95,500	......	..	..	..	......
60	40	5.	STRUCTURAL WOOD (e)1350; (j)530 M	135,000	13	40	24	167,400	62,300	14	40	24.4	77,500	......	..	..	..	......
58	42	6.	CMT. FLOOR ON GROUND, 3500 CU. YD.	43,300	0	30	12.6	48,700	43,300	0	30	12.6	48,700	43,300	0	30	12.6	48,700
100	..	7.	MISCELLANEOUS IRON & STEEL	4,200	15	..	15	4,800	4,200	15	..	15	4,800	4,200	15	..	15	4,800
50	50	8.	CONCRETE BLOCK MASONRY	23,300	0	30	15	26,800	23,300	0	30	15	26,800	18,200	0	30	15	20,900
60	40	9.	ROOFING & SHEET METAL	18,000	7	40	20	21,600	18,000	7	40	20	21,600	19,800	7	40	20	23,800
80	20	10.	SKYLIGHTS & VENTILATORS	13,000	0	30	6	13,800	13,000	0	30	6	13,800	13,800	0	30	6	14,600
80	20	11.	METAL TOILET PARTITIONS	800	3	40	10	900	800	3	40	10	900	800	3	40	10	900
80	20	12.	ROLLING STEEL DOORS	3,700	7.5	20	10	4,100	3,700	7.5	20	10	4,100	3,700	7.5	20	10	4,100
80	20	13.	KALAMEIN & TIN CLAD DOORS	2,400	10	30	14	2,700	2,400	10	30	14	2,700	2,400	10	30	14	2,700
75	25	14.	STEEL SASH & CAULKING	6,200	0	30	7.5	6,600	6,200	0	30	7.5	6,600	6,200	0	30	7.5	6,600
55	45	15.	GLASS & GLAZING	3,000	0	10	4.5	3,100	3,000	0	10	4.5	3,100	3,000	0	10	4.5	3,100
50	50	16.	PAINTING	2,700	0	40	20	3,200	5,700	0	40	20	6,800	2,700	0	40	20	3,200
60	40	17.	RADIAL BRICK CHIMNEY	1,800	0	30	12	2,000	1,800	0	30	12	2,000	1,800	0	30	12	2,000
80	20	18.	HEATING	11,000	9.3	30	13.4	12,500	11,000	9.3	30	13.4	12,500	14,800	9.3	30	13.4	16,800
55	45	19.	PLUMBING & DRAINAGE	12,000	50	30	41	16,900	12,000	50	30	41	16,900	12,000	50	30	41	16,900
65	35	20.	ELECTRIC WIRING & FIXTURES	12,500	10	30	17	14,600	12,500	10	30	17	14,600	12,500	10	30	17	14,600
		21.	PLANT & EQUIPMENT (INCLUDED ABOVE)	......	..	..	..	......	......	..	..	..	......	......	..	..	..	......
		22.	INSURANCE	900	0	0	0	1,100	900	0	0	0	1,000	400	0	0	0	500
40	60	23.	JOB OVERHEAD	14,900	10	10	10	16,400	15,400	10	10	10	16,900	17,000	10	10	10	18,700
		24.	SURETY BOND PREMIUM (NONE)	......	..	..	..	......	......	..	..	..	......	......	..	..	..	......
				$320,000				$380,000	$342,000				$389,800	$349,000				$403,700
		25.	CONTRACTOR'S FEE, 10%±	32,000				38,000	34,000				38,200	35,000				40,300
			TOTAL COST	$352,000	Average Total			$418,000	$376,000	Average Total			$428,000	$384,000	Average Total			$444,000
			COST PER SQ. FT.	$1.56	Materials....71%			$1.86	$1.67	Materials.....83%			$1.90	$1.71	Materials.....68%			$1.97
			COST PER CU. FT.	$0.078	Field Labor...29%			$0.093	$0.079	Field Labor...17%			$0.091	$0.081	Field Labor...32%			$0.094
			INCREASED COST 1943 OVER 1941, %					19					14					15.7

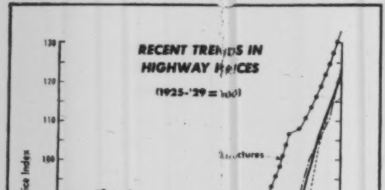
Col. (j). If cement tile roof is used instead of wood on steel building add $12,000, total cost $388,000 or $1.73 per sq. ft. (1941).
Col. (n). If cement tile roof is used instead of wood on steel building no increase in total cost of $428,000 or $1.90 per sq. ft. (1943).
ITEMS NOT INCLUDED: All sewers, water lines, electrical service, underground feeders, outside grading, pavement, fences, railroad track, outside loading platforms, canopies, street lighting or roof insulation. Mechanical work in building is included only to extent specified in Table 3.

Roadbuilding Costs

THE PRICE TREND in highway construction for a composite standard mile climbed sharply throughout 1942 and reached the highest yearly average reported since 1924 according to the Public Roads Administration. The PRA Index is based on average prices in the 1925-1929 period for a composite mile of road. In the index are included excavation, surfacing and structures. For comparative purposes, the quantities are considered as unvarying, but in actual practice, the quantities are constantly changing.

Substantially higher costs prevailed in all divisions of work that make up the composite mile index. Excavation bid price average climbed from 26c. per cubic yard in the fourth quarter of 1941 to 41c. at the end of 1942; surfacing costs rose from $1.96 per square yard at the 1941 year-end to $2.73 in the final quarter last year. All three sections of the structures index gained: reinforcing steel bid price rose from 6c. per pound in 1941 to 7c. at the end of 1942; structural steel from 8.2c. to 9.1c.; and structural concrete from $22.32 per cubic yard to $29.01 in the twelve-month interval since December, 1941.

Quarterly statistics on these prices and the base quantities required for the construction of the composite standard mile are shown in the accompanying table, and in the charts at the bottom of the page.



Price Trend in Highway Construction for Composite Standard Mile

Year	Excavation [1] (17,491* cubic yards)		Surfacing [2] (3,726* square yards)		Structures				Composite mile
					Reinforcing steel (16,000* pounds)	Structural steel (4,325* pounds)	Structural concrete (68* cubic yards)	Combined	
	Bid price [3]	Sub-index	Bid price [3]	Sub-index	Bid price [3]	Bid price [3]	Bid price [3]	Sub-index	Index
Base period, 1925 to 1929	$0.35†	100.0	$2.22†	100.0	$0.052†	$0.067†	$22.15†	100.0	100.0
1922	.40	114.5	2.28	102.7	.050	.074	20.18	95.1	105.8
1923	.47	133.3	2.43	109.5	.057	.078	23.37	108.6	117.9
1924	.43	122.2	2.40	108.3	.057	.077	22.91	107.2	113.1
1925	.39	110.0	2.36	106.4	.056	.067	22.53	103.9	107.3
1926	.36	103.7	2.29	103.1	.053	.074	22.76	103.7	103.4
1927	.35	100.3	2.29	103.3	.051	.071	22.65	101.5	101.9
1928	.34	96.0	2.10	94.5	.049	.067	21.22	96.1	95.3
1929	.32	90.0	2.05	92.7	.048	.059	21.58	95.0	92.1
1930	.30	86.3	1.86	84.1	.045	.061	20.08	89.4	85.7
1931	.27	77.2	1.68	75.6	.040	.054	18.02	79.9	76.8
1932	.18	52.3	1.45	65.2	.034	.046	15.32	68.0	64.0
1933	.26	73.6	1.67	75.1	.037	.046	16.15	72.1	74.1
1934	.29	82.8	1.91	86.0	.043	.053	17.73	80.8	84.0
1935	.26	73.7	1.90	85.5	.044	.052	17.78	81.5	80.6
1936	.26	75.4	1.91	86.3	.046	.060	20.25	90.0	82.9
1937									
1st Q	**.25**	**71.2**	**1.88**	**84.8**	**.047**	**.063**	**20.31**	**91.7**	81.0
2nd Q	**.23**	**65.5**	**1.90**	**85.8**	**.049**	**.067**	**19.42**	**91.3**	79.3
3rd Q	**.23**	**66.1**	**1.85**	**83.4**	**.049**	**.067**	**19.42**	**91.5**	78.4
4th Q	**.22**	**63.8**	**1.91**	**85.9**	**.048**	**.065**	**19.90**	**91.3**	78.8
1938									
1st Q	**.21**	**61.0**	**1.77**	**79.8**	**.046**	**.065**	**19.13**	**88.6**	74.4
2nd Q	**.21**	**60.1**	**1.67**	**75.2**	**.046**	**.064**	**19.10**	**88.2**	71.8
3rd Q	**.21**	**60.7**	**1.73**	**77.8**	**.044**	**.061**	**18.73**	**85.4**	72.8
4th Q	**.21**	**59.8**	**1.70**	**76.7**	**.044**	**.060**	**19.29**	**86.7**	72.2
1939									
1st Q	**.21**	**58.7**	**1.73**	**78.0**	**.043**	**.058**	**19.46**	**86.4**	72.3
2nd Q	**.21**	**59.3**	**1.72**	**77.4**	**.043**	**.059**	**19.03**	**85.4**	72.1
3rd Q	**.21**	**60.1**	**1.76**	**79.4**	**.043**	**.060**	**18.95**	**85.1**	73.3
4th Q	**.21**	**60.4**	**1.71**	**76.9**	**.045**	**.060**	**19.07**	**86.8**	72.5
1940									
1st Q	**.20**	**57.0**	**1.69**	**76.4**	**.045**	**.061**	**18.88**	**86.2**	70.9
2nd Q	**.21**	**58.7**	**1.65**	**74.6**	**.043**	**.061**	**19.07**	**85.9**	70.6
3rd Q	**.21**	**60.4**	**1.67**	**75.3**	**.044**	**.064**	**18.95**	**86.3**	71.6
4th Q	**.21**	**60.4**	**1.72**	**77.7**	**.046**	**.066**	**19.79**	**90.0**	73.3
1941									
1st Q	**.22**	**62.4**	**1.78**	**80.4**	**.047**	**.066**	**19.99**	**91.3**	75.6
2nd Q	**.24**	**69.5**	**1.86**	**83.8**	**.051**	**.075**	**20.88**	**97.6**	80.8
3rd Q	**.25**	**71.2**	**1.94**	**87.5**	**.057**	**.080**	**22.56**	**106.4**	84.5
4th Q	**.26**	**74.4**	**1.96**	**88.6**	**.060**	**.082**	**22.32**	**107.8**	86.4
1942									
1st Q	**.31**	**87.5**	**2.21**	**99.7**	**.061**	**.084**	**23.72**	**112.6**	**97.3**
2nd Q	**.36**	**103.1**	**2.34**	**105.3**	**.063**	**.091**	**24.93**	**118.3**	**106.5**
3rd Q	**.40**	**114.0**	**2.46**	**110.8**	**.066**	**.095**	**26.97**	**125.6**	**114.2**
4th Q	**.41**	**115.7**	**2.73**	**123.0**	**.070**	**.091**	**29.01**	**132.8**	**121.8**

[1] Common excavation plus other excavation items expressed as equivalent common excavation.

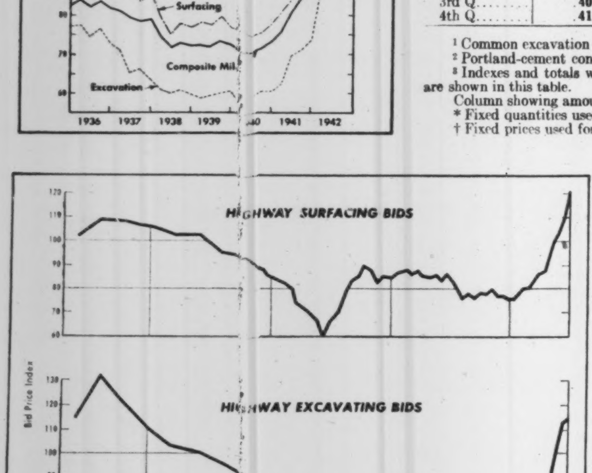
[2] Portland-cement concrete plus other surfacing items expressed as equivalent portland-cement concrete.

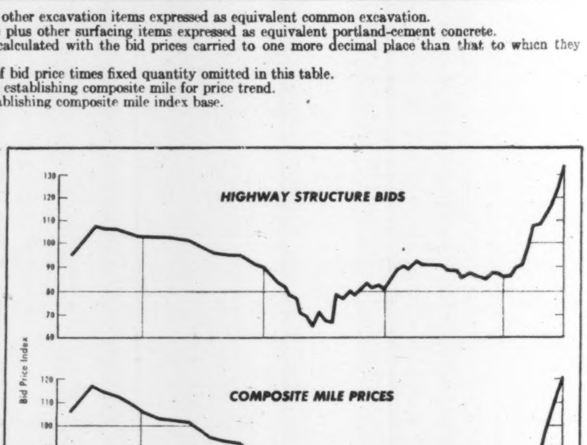
[3] Indexes and totals were calculated with the bid prices carried to one more decimal place than that to which they are shown in this table.

Column showing amount of bid price times fixed quantity omitted in this table.

* Fixed quantities used for establishing composite mile for price trend.

† Fixed prices used for establishing composite mile index base.





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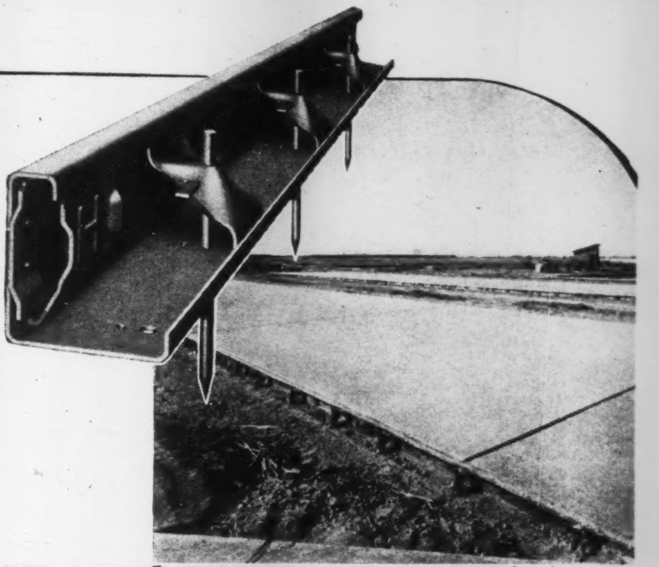

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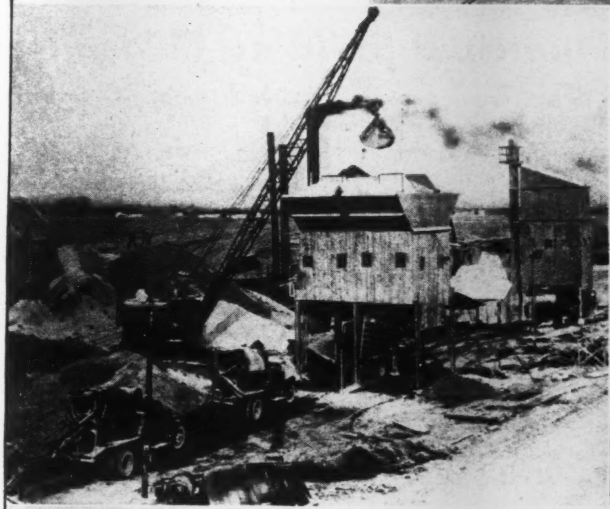

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Cost Data on War Construction Projects

Bureau of Labor Statistics Division of Construction and Public Employment

LABOR, MATERIALS AND MAN-HOURS PER $1,000,000 OF CONTRACTS FOR SPECIFIED TYPES OF WAR CONSTRUCTION

Type of Project	Period of Construction	Expenditures (in thousands of dollars)			Percent for Labor and Materials		Man-Hours Worked			Aver. Hourly Earnings (Constr. Site)
		Labor at Constr. Site	Material	Total Labor and Mat'l	Labor %	Material %	At Constr. Site	Away-from-site Labor*	Total Man Hours	
Defense housing projects—(All types)	1940–42	$345	$475	$820	42.1	57.9	338,000	418,900	756,900	$1.021
Defense housing projects—with circulating heaters	1940–42	319	481	800	39.9	60.1	353,000	450,200	803,200	.904
Defense housing projects—with forced warm air heating systems	1940–42	326	473	799	40.8	59.2	324,000	431,600	755,600	1.006
Productive facilities[1]	1941–42	300	535	835	35.9	64.1	284,500	410,900	695,400	1.054
Ordnance plants	1941–42	448	418	866	51.7	48.3	395,700	339,100	734,800	1.132
Plants for aircraft production	1941–42	297	507	804	36.9	63.1	261,800	419,000	680,800	1.134
Cantonment camps	1940–41	438	388	826	53.0	47.0	439,300	395,400	834,700	.997
Tent camps	1940–41	364	457	821	44.3	55.7	443,800	439,500	883,300	.820
General hospitals (Army)	1940–42	297	541	838	35.4	64.6	315,000	417,000	732,000	.943
Hangars	1940–42	240	553	793	30.3	69.7	222,200	474,200	696,400	1.080
Water and sewer systems	1940–42	321	491	812	39.5	60.5	330,500	423,200	753,700	.971
Sewers and sewer systems	1940–42	295	502	797	37.0	63.0	314,000	444,800	758,800	.939
Water supply systems	1940–42	340	481	821	41.4	58.6	346,300	413,800	760,100	.982
War public works projects[2]										
Schools	1941–43	313	512	825	37.9	62.1	289,800	409,600	699,400	1.080
Sewers and sewer systems	1941–43	305	493	798	38.2	61.8	294,300	419,100	713,400	1.036

* In mines, forests, factories and transportation, and in administration.

[1] Includes both privately and publicly operated productive facilities and ship-building facilities.

[2] Projects financed from "Lanham Act" funds.

Municipal Building Costs—New York City

The various types of buildings listed were designed, constructed and completed during 1942 under the supervision of the Department of Public Works, New York, N. Y., Irving V. A. Huie, Commissioner, and Homer R. Seely, Deputy and Acting Commissioner.

ADMINISTRATION BUILDING

ADMINISTRATION BUILDING—55 feet by 241 feet—containing four merchant stores—each 40 feet wide by 55 feet deep—one story in height with mezzanine at rear—center portion of building, 55 feet by 161 feet long, is two stories in height—same construction as for other buildings except that steel is fireproofed. Central gas-fired heating plant in basement boiler room. Building contains cafeteria, barber shop, dormitories for transient farmers (120 beds), shower room, toilets, merchants meeting room, administrative offices having colored cement floors.

Cubic foot cost	$0.40
Square foot cost	6.35

WHOLESALE MARKET

SIX MARKET BUILDINGS—each 110 feet by 241 feet—each containing twelve merchant stores, 40 feet wide by 55 feet deep, back-to-back type party wall—one story in height with office mezzanine at rear; steel frame construction, face brick exterior with bonded unglazed tile units on interior; commercial projected steel sash; metal clad; cinder concrete mezzanine slab; asphalt block floor; concrete plank roof; fibre insulated roof; built-up slag roof; wood pile foundations; gas-fired unit heaters. No basement. Each building has a 15-foot cantilevered canopy of steel-frame construction; precast concrete plank roof and cement plaster (on metal lath soffit).

Cubic foot cost	$0.36
Square foot cost	5.37

TWO MARKET BUILDINGS—each 55 feet by 241 feet deep, each containing six merchant stores, 40 feet by 55 feet deep—single type; no basement. Same construction as back-to-back type stores.

Cubic foot cost	$0.40
Square foot cost	6.06

Highway Maintenance Costs

ANNUAL HIGHWAY MAINTENANCE COSTS PER MILE AND FACTORS AFFECTING MAINTENANCE COSTS

Average Based on 4 to 6-year Period—57 Surface Types Included (Costs shown are on 1925–1929 price index base)

ITEM	Region									United States
	Pacific	Mountain	West North Central	West South Central	East North Central	East South Central	New England	Middle Atlantic	South Atlantic	
Total cost	$593	$376	$407	$346	$519	$366	$1,090	$966	$374	$471
Surface	$213	$170	$216	$153	$152	$220	$245	$236	$195	$194
Shoulders and approaches	$75	$59	$28	$73	$89	$54	$136	$169	$67	$67
Roadside, drainage and structures	$189	$78	$68	$87	$128	$78	$265	$244	$81	$107
Traffic service, including snow, ice and guardrail	$116	$69	$95	$33	$150	$14	$444	$317	$31	$103
Labor	46%	45%	42%	48%	45%	42%	46%	51%	42%	45%
Materials	19%	17%	21%	21%	17%	23%	21%	22%	29%	21%
Equipment	25%	31%	29%	19%	26%	24%	28%	20%	21%	25%
Overhead	10%	7%	8%	12%	12%	11%	5%	7%	8%	9%
Miles	1.285	2,678	4,055	2,152	2,008	1,841	1,042	666	2,416	18,143
Surface width, feet	19.6	19.3	21.0	18.6	20.1	18.7	21.9	20.9	18.7	19.8
Traffic, 24-hour	1,456	689	861	1,013	1,728	765	2,364	3,945	1,104	1,203
Total maintenance rating	94	91	87	88	89	85	94	94	91	89

Note: 38 states reporting 6 years; 7 states reporting 5 years; 2 states 4 years; 1 state not reporting. Prepared by the Maintenance Section, PRA

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War-Housing Projects Cost Summary

THE FOLLOWING TABLE shows total development costs and average costs per dwelling unit by major cost classifications for typical public war-housing projects put under contract by the Federal Public Housing Authority. All projects included in the table are family dwellings of temporary construction and the data show costs at the time of contract award. Variations in project composition, such as the size of families to be accommodated, the type of utilities and equipment installed, and the number of commercial and other project facilities provided, affect the comparability of the individual project costs that are tabulated below.

Location of Project	No. of Dwelling Units	Total Development Cost	Average Cost per Dwelling Unit: Total Development	Dwelling Facilities [1]	Non-Dwelling Facilities [2]	Site Improvement [3]	Site Acquisition [4]	Architects, Engr'g. and Other [5]
Alabama								
Courtland	175	$406,394	$2,322	$1,716	$58	$307	$30	$211
Decatur	50	115,982	2,319	1,541	65	392	57	264
Foley	90	203,112	2,257	1,607	63	357	11	219
Mobile	1,214	3,124,263	2,574	1,862	167	363	5	177
Arizona								
Greenlee County	230	847,400	3,685	2,692	....	724	7	262
California								
Alameda	1,240	3,499,900	2,822	2,133	46	442	13	188
Richmond	800	1,640,000	2,050	1,604	3	240	46	157
San Jose Township	40	127,200	3,180	2,326	81	444	8	321
Colorado								
La Junta	140	434,232	3,102	2,100	48	683	2	269
Naturita	50	183,666	3,673	2,650	....	741	7	275
Rifle	44	153,373	3,485	2,509	....	708	2	266
Uravan	68	236,068	3,470	2,335	....	870	1	264
Connecticut								
Wallingford	68	177,664	2,612	1,980	58	315	5	254
Stratford	400	1,079,046	2,697	1,970	30	364	130	203
District of Columbia								
Washington	500	1,564,029	3,128	2,316	60	390	139	223
Florida								
Carrabelle	390	985,744	2,527	1,774	112	435	2	204
Fort Myers	60	156,441	2,607	1,887	32	414	8	266
Key West	624	1,893,681	3,035	2,240	157	380	32	226
Georgia								
Brunswick	1,100	2,838,207	2,580	2,107	24	255	12	182
Savannah	425	968,498	2,279	1,715	72	307	5	180
Idaho								
Pocatello	170	497,780	2,928	2,146	48	479	9	246
Illinois								
Rock Island	136	462,700	3,402	2,062	103	606	122	509
Rosiclare	150	616,074	4,107	3,049	166	502	11	379
Seneca	500	1,578,717	3,157	1,806	97	948	21	285
Maine								
Portland	500	1,476,757	2,954	2,114	60	520	37	223
Maryland								
Aberdeen	250	680,300	2,721	1,805	320	372	6	218
Michigan								
Town Site	2,500	9,288,049	3,715	2,038	89	1,045	287	256
Muskegon	124	397,425	3,205	2,166	210	481	60	288
Mississippi								
Aberdeen	290	628,347	2,167	1,505	147	307	8	200
Montana								
Anaconda	200	643,562	3,217	2,490	....	454	4	269
Great Falls	100	327,257	3,273	2,407	59	495	2	310
New York								
Niagara Falls	600	1,366,706	2,277	1,719	47	323	12	176
North Carolina								
Burlington	100	234,169	2,342	1,474	166	382	88	232
Laurinburg	34	77,623	2,283	1,736	....	283	....	264
Wilmington	250	655,490	2,622	1,687	158	518	17	242
Ohio								
Akron	500	1,666,827	3,334	2,408	65	532	73	256
Canton	200	783,644	3,918	2,500	76	635	300	407
Dayton	200	459,029	2,295	1,768	....	270	55	202
Windham	2,000	7,400,000	3,700	2,987	90	408	20	195
Oregon								
Portland	476	1,522,244	3,198	2,260	107	600	9	222
Medford	125	316,100	2,529	1,724	44	427	74	260
Fort Stevens	20	70,100	3,505	2,445	....	613	57	390
South Carolina								
Charleston	1,000	2,329,012	2,329	1,733	33	390	5	168
Texas								
Fort Worth	500	1,393,593	2,787	1,935	230	398	42	182
Utah								
Garfield	134	494,712	3,692	2,760	27	646	4	255
Virginia								
Arlington	820	2,904,300	3,542	2,286	49	961	9	237
Blackstone	51	149,200	2,925	2,180	8	416	31	290
Washington								
Ephrata	100	318,417	3,184	2,312	58	515	28	271
Kirkland	500	1,255,546	2,511	1,708	132	372	85	214
Seattle	400	947,457	2,369	1,594	46	349	174	206
Vancouver	200	636,504	3,182	2,117	337	429	69	230
Wisconsin								
Manitowoc	250	672,000	2,688	1,709	151	558	2	268
Merrimac	500	1,353,200	2,706	1,589	233	636	13	235
Sturgeon Bay	500	1,395,636	2,791	1,950	65	505	25	246

Notes: [1] Cost of dwelling structures including plumbing, heating and electrical costs, and furnishings and movable equipment such as ranges, refrigerators and portable space heaters; excludes allowances for contingencies. [2] Cost of management and maintenance and other non-dwelling buildings, spaces, and equipment. [3] Cost of clearing and general grading, streets and walks, utility mains, including sewers, water, gas and electrical systems, landscaping and other costs of developing the site; excludes allowances for contingencies. [4] Cost of land and land acquisition expense. [5] Includes amounts for architectural and engineering services, costs of inspection and supervision on project site, administrative costs of local housing authority directly traceable to the project (when developed by a local public housing authority), and allowances for contingencies.

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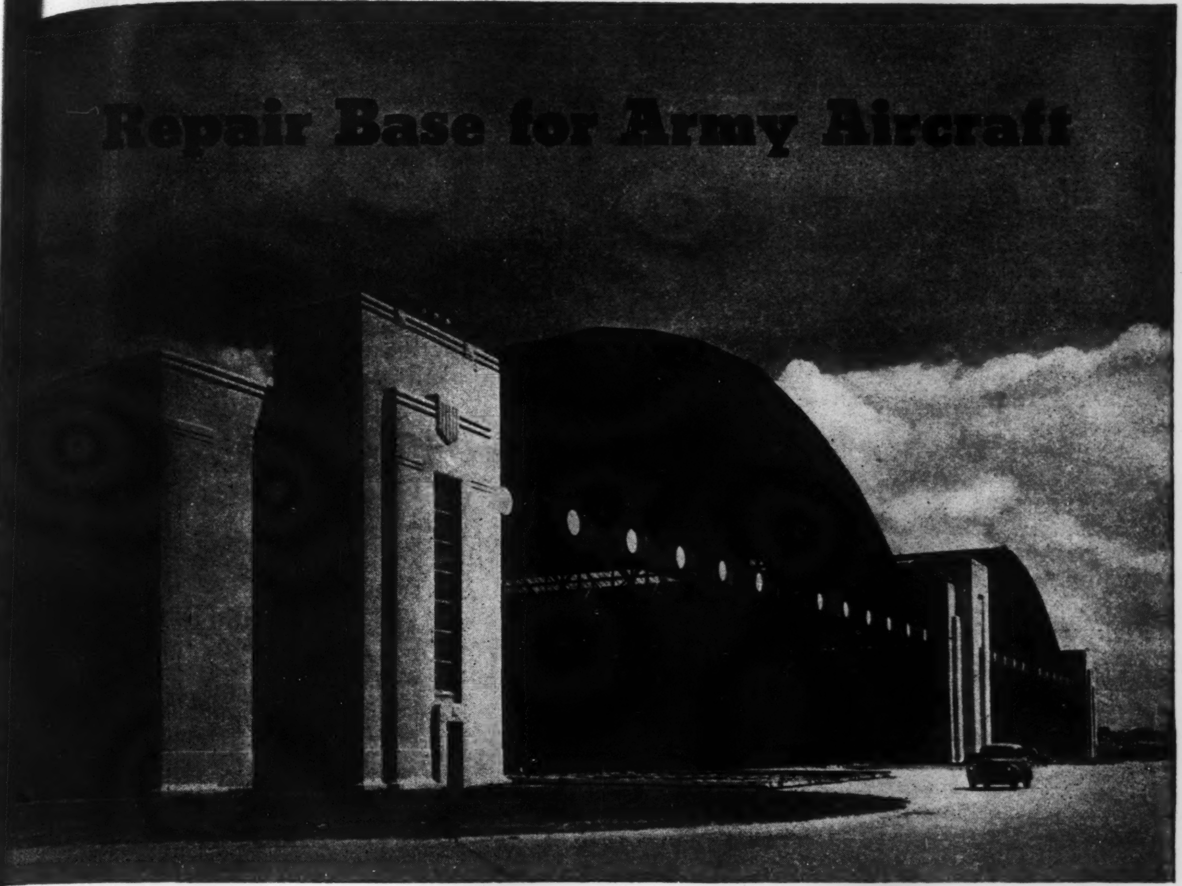
Repair Base for Army Aircraft



The airplane-repair building at Robbins Field.

he U. S. Army Air Corps has established in the outh a central, completely-equipped base to repair nd rebuild aircraft from all Southern training fields. his air depot, designated Robbins Field, is the last ord in repair bases. Complete supplies of engines, uselages, wings, landing gears, radios and other quipment are on hand to refit or rebuild any plane, rom fast pursuit to heavy bomber.

Designed by U. S. Army engineers, Robbins Field onsists of two large supply buildings, an airplane-epair building, shown here; a flight-test hangar, and everal additional buildings. Steel for the framework f all these buildings was fabricated and erected by Bethlehem Steel Company, using 8,595 tons of tructural steel.

This job is typical of the many Army and Navy onstruction projects throughout the nation in which Bethlehem is lending a helping hand.

Architects and Engineers: U. S. Army Engineers.
Joint Contractors: Griffin Construction Co.,
Mion Construction Co., and W. C. Shepherd.

Interior of one of the hangars of the airplane-repair building.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Index of Small House Costs

THE INDEX of Building Costs for the same standard six-room house in approximately 80 United States cities is computed monthly by the Federal Home Loan Bank Board. The cities, individual indexes for which are tabulated on the following page, are divided into three groups, and one group is reported each month. Thus, the index of costs in each city is available four times a year.

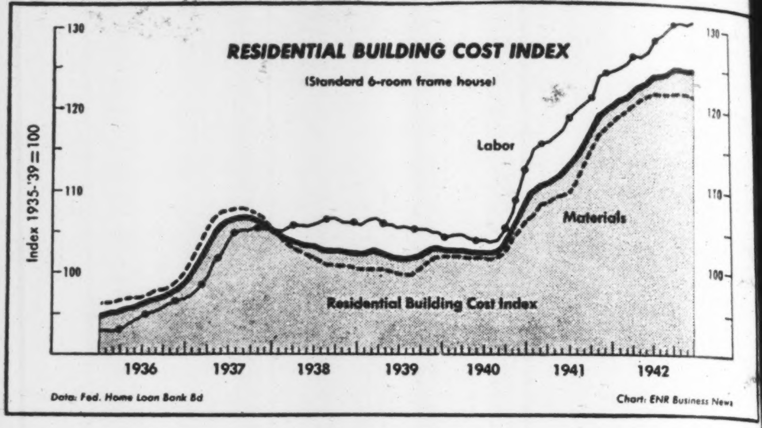
The combined index of small house costs for the United States is based on these 80-city reports, and is computed in the following manner: to the average cost for each month for the reporting cities in that month is added the cost for the previous month from the prior reporting cities and the cost in the subsequent month for the third reporting group. The arithmetic average of the three reporting groups is taken as the average cost for the middle month for the entire nation. This 3-month moving average is computed and reported monthly.

The house on which costs are reported is a detached six-room home of 24,000-cu.ft. volume. Living room, dining room, kitchen and lavatory are on first floor, and three bedrooms and bath on the second. Exterior is wide-board siding with brick and stucco as features of design. Best quality materials and workmanship are used throughout. It includes all fundamental structural elements, an attached one-car garage, unfinished cellar, unfinished attic, fireplace, essential heating, plumbing and electric wiring equipment, and complete insulation. The building involves the use of about 110 material items, and nine major labor groups. Five percent is added to the labor cost to cover compensation insurance; 2 percent is added to total cost for operating expenses; and 10 percent is added for builders' profit.

Reported costs do not include the cost of land nor the surveying of the land, the cost of planting the lot, nor of providing walks and driveways. They do not include architect's fee, cost of building permit, financing charges, nor sales costs.

Prices on same building materials list are obtained quarterly from same dealers, and wages are from the same reputable contractors and builders.

Indexes of Building Costs for Standard 6-Room Fram House (1935-1939 = 100) Fed. Home Loan Bank Bd.



Data: Fed. Home Loan Bank Bd

Chart: ENR Business News

Combined Index

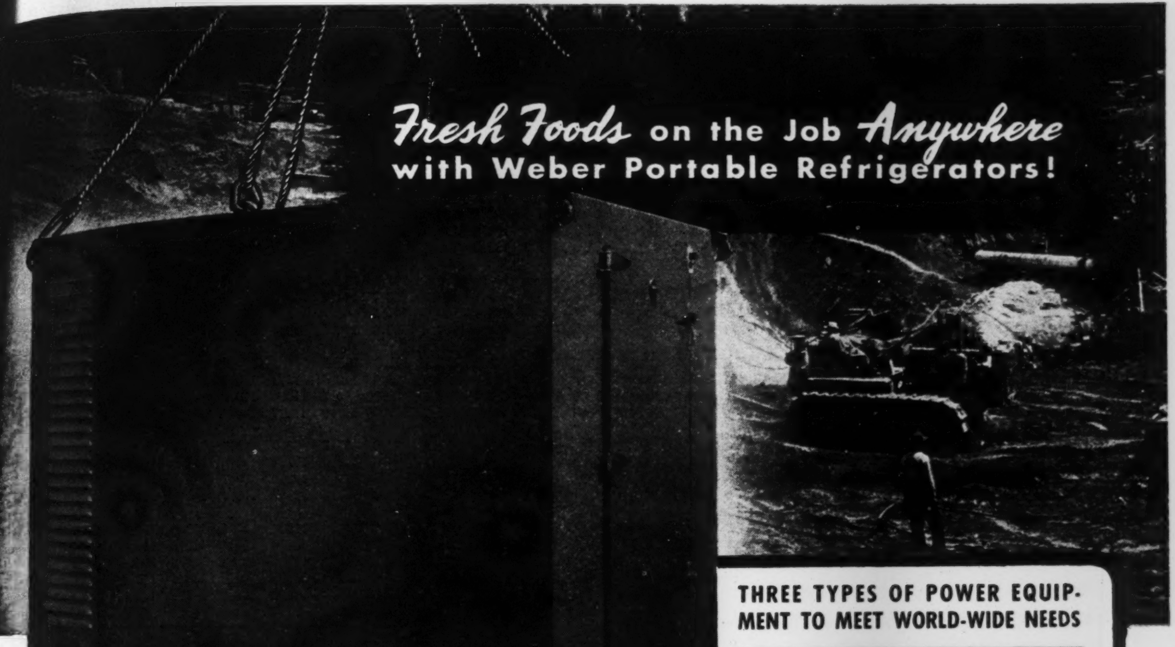
	1936	1937	1938	1939	1940	1941	1942	1943
January	94.7	99.6	104.3	101.9	102.3	109.3	120.6	124.7
February	94.9	100.9	103.8	102.0	102.4	110.2	121.2	125.5
March	95.0	102.6	103.5	102.1	102.3	110.4	122.0	.....
April	95.3	104.2	103.1	101.8	102.1	111.2	122.3	.....
May	95.6	105.0	102.8	101.6	102.2	111.6	122.8	.....
June	95.8	105.8	102.8	101.4	102.1	112.4	123.5	.....
July	96.2	106.3	102.7	101.3	102.0	113.6	123.7	.....
August	96.6	106.4	102.3	101.2	102.1	115.1	124.0	.....
September	96.8	106.3	102.3	101.6	102.9	116.5	124.4	.....
October	97.1	106.0	102.1	102.0	104.6	118.5	124.5	.....
November	97.7	105.7	102.1	102.4	106.4	119.2	124.4	.....
December	98.5	104.9	102.0	102.5	108.1	119.9	124.5	.....
Average	**96.2**	**104.5**	**102.8**	**101.8**	**103.3**	**114.0**	**123.2**	.....

Material Index

	1936	1937	1938	1939	1940	1941	1942	1943
January	95.8	101.0	104.1	100.0	101.4	106.6	118.6	121.5
February	96.0	102.5	103.3	100.0	101.5	107.8	119.3	121.9
March	96.2	104.5	102.6	100.0	101.4	108.0	120.0	.....
April	96.3	105.9	102.1	99.9	101.3	108.7	120.5	.....
May	96.5	106.8	101.7	99.7	101.3	108.8	121.0	.....
June	96.6	107.0	101.5	99.5	101.3	109.2	121.3	.....
July	97.0	107.2	101.1	99.4	101.2	110.7	121.2	.....
August	97.4	107.3	100.4	99.3	101.4	112.6	121.2	.....
September	97.5	107.1	100.4	99.9	101.9	114.4	121.5	.....
October	97.8	106.5	100.2	100.6	100.4	116.0	121.6	.....
November	98.4	106.0	100.2	101.3	104.6	116.9	121.5	.....
December	99.5	104.9	100.0	101.5	105.9	117.7	121.4	.....
Average	**97.1**	**105.6**	**101.5**	**100.1**	**102.2**	**111.5**	**120.8**	.....

Labor Index

	1936	1937	1938	1939	1940	1941	1942	1943
January	92.6	96.9	104.7	105.6	104.0	114.5	124.5	130.9
February	92.6	97.6	104.7	105.9	104.2	115.1	125.0	132.5
March	92.7	98.9	105.2	106.1	104.1	115.3	126.0	.....
April	93.2	100.7	105.2	105.6	103.8	116.1	125.9	.....
May	93.8	101.7	105.1	105.3	103.7	117.0	126.4	.....
June	94.3	103.3	105.3	105.0	103.5	118.6	127.8	.....
July	94.7	104.4	105.7	105.1	103.4	119.3	128.5	.....
August	94.9	104.7	106.0	104.9	103.6	120.0	129.4	.....
September	95.3	104.8	106.1	104.9	104.8	120.7	130.2	.....
October	95.8	105.0	105.8	104.8	106.9	123.3	130.2	.....
November	96.3	105.0	105.8	104.6	109.8	123.9	130.2	.....
December	96.4	104.8	105.8	104.4	112.5	124.2	130.7	.....
Average	**94.4**	**102.3**	**105.4**	**105.2**	**105.4**	**119.0**	**127.9**	.....



Fresh Foods on the Job *Anywhere* with Weber Portable Refrigerators!

Capacity: 150 Cu. Ft.

Size: 6' x 9' x 7'5" high

Shipping Weight: 6000 lbs.

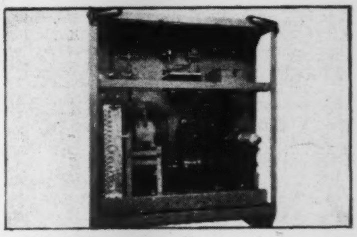
WEBER LIFT REFRIGERATORS are keeping foods fresh where they are needed most...wherever men must be fed. In any climatic condition from the South Seas to Alaska—and on the way, too, by water, rail or truck—this adaptable unit can operate continuously on either gasoline or electric power, A.C. or D.C.

The sturdy power plant requires no refrigeration expert. It's easy to put into operation. This refrigerator will maintain a 10° temperature in a 110° ambient temperature for frozen foods or can be set at 35° with a 100° temperature differential.

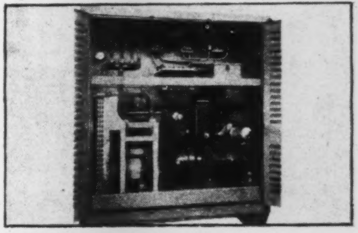
To meet the demands of our contractors and armed forces, anywhere in the world, Weber produced this refrigerator.

***Wherever* the demands of war involve a refrigerator problem, or any special manufacturing problem in metal, wood or glass, Weber facilities are available. Write, wire for complete specifications.**

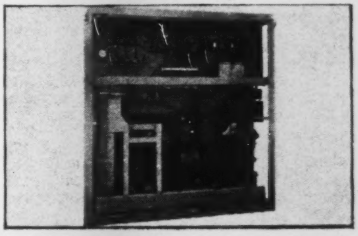
THREE TYPES OF POWER EQUIPMENT TO MEET WORLD-WIDE NEEDS



TYPE B Direct Gasoline engine power operated.



TYPE U Direct Gasoline engine, convertible to A.C. Power.



TYPE H Gasoline powered electric generator and A.C. or D.C. operation.

WEBER FACILITIES & EXPERIENCE "WORKING FOR VICTORY"

WEBER SHOWCASE & FIXTURE CO. INC., 5700 AVALON BLVD., LOS ANGELES, CALIF. • EST. 1898

Index of Costs for Standard House in Representative Cities — 1935-1939 =100

Federal Home Loan Bank Board

	1938				1939				1940				1941				1942			
	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.
Albany, N. Y.	107.5	.....	103.1	101.1	99.5	101.6	100.4	101.9	102.2	103.3	102.5	102.9	112.3	119.4	120.6	122.5	124.6	123.2	130.9	134.2
Atlantic City, N. J.	99.9	.....	99.8	99.4	97.4	96.7	98.7	150.5	105.4	102.4	100.7	103.9	118.7	120.6	120.6	122.1	122.7	124.9	125.3	125.4
Boise, Idaho	100.8	99.3	99.5	101.9	103.2	104.6	104.6	103.8	105.6	106.2	106.5	109.3	111.7	111.7	113.8	112.4	124.4	132.7	132.9	132.9
Buffalo, N. Y.	104.6	101.3	102.6	105.0	102.0	100.2	99.2	104.7	100.6	100.9	101.1	101.6	108.8	112.0	117.3	121.6	123.7	125.4	128.2	128.1
Camden, N. J.	104.3	103.9	104.2	101.5	101.9	103.7	101.8	106.5	108.5	108.8	108.8	114.2	117.1	117.3	124.2	141.5	141.0	142.1	145.9	147.0
Casper, Wyo.	102.9	102.3	101.8	101.5	101.9	103.1	102.9	104.0	101.5	98.8	95.0	95.0	101.7	100.5	100.8	101.8	103.6	103.6	103.4	.....
Des Moines, Iowa	101.4	99.4	99.0	99.8	101.6	101.6	101.8	102.0	102.6	102.6	102.8	103.6	103.8	103.4	100.5	105.3	108.0	109.9	113.0	113.8
Detroit, Mich.	107.0	105.6	107.6	108.0	108.3	107.2	107.2	104.0	101.9	102.0	102.4	105.4	108.6	108.3	113.7	119.6	120.7	124.7	124.7	130.7
Duluth, Minn.	105.8	104.9	105.0	104.7	101.2	101.5	101.6	102.3	104.9	104.8	104.3	104.3	104.5	104.5	105.7	109.6	110.8	112.8	118.4	118.1
Evansville, Ind.	101.0	101.0	.....	100.6	102.5	100.7	103.3	106.7	107.1	107.0	107.0	110.7	114.1	113.5	114.4	119.7	127.0	126.4	126.4	126.2
Fargo, N. D.	104.3	102.7	102.3	102.1	99.1	99.0	98.1	102.3	102.6	102.4	100.7	101.5	103.6	103.0	101.8	107.9	108.3	111.4	113.6	115.4
Grand Rapids, Mich.	107.2	107.2	107.3	106.5	107.0	105.8	105.6	102.9	99.6	100.0	102.6	106.8	116.1	112.5	118.5	129.8	133.2	136.8	127.0	128.5
Great Falls, Mont.	103.0	104.9	104.5	.....	102.9	103.4	101.9	101.3	102.3	101.5	101.3	101.3	105.1	107.4	107.2	111.0	111.6	112.8	112.8	.....
Indianapolis, Ind.	100.8	102.6	102.4	101.7	102.9	105.3	105.1	101.0	98.5	96.8	96.9	98.0	112.5	113.1	112.8	116.4	120.6	121.9	121.9	129.9
Kansas City, Mo.	103.7	101.8	102.1	.....	103.1	105.8	108.6	105.8	106.9	106.5	104.4	102.9	110.7	110.4	110.8	116.1	118.6	125.5	125.6	129.3
Newark, N. J.	100.2	101.4	102.4	103.4	103.5	103.4	102.6	105.6	106.6	106.6	106.7	107.0	113.2	114.7	131.1	135.8	136.5	137.0	146.3	153.9
Portland, Ore.	100.0	95.2	95.4	98.7	99.4	95.6	96.2	97.8	97.9	97.6	97.5	99.0	97.7	98.9	99.3	106.6	110.4	.....	117.1	117.1
St. Louis, Mo.	101.3	98.6	97.2	97.4	98.7	98.2	96.5	98.2	100.1	99.3	99.2	99.8	101.6	102.1	103.8	107.0	106.0	107.5	108.5	108.7
St. Paul, Minn.	.....	108.0	108.1	107.9	107.9	108.5	108.2	108.2	107.8	107.3	107.1	107.5	109.2	109.2	109.7	112.7	114.7	115.9	118.7	118.7
Salt Lake City, Utah	103.2	101.9	101.0	100.5	100.5	103.0	102.8	102.5	103.1	102.8	102.7	104.0	108.6	109.7	116.3	120.6	120.2	121.5	122.3	122.3
Seattle, Wash.	106.0	104.7	101.9	102.0	102.2	102.7	101.9	102.8	102.9	103.6	103.3	105.2	111.8	113.4	117.1	119.6	121.1	122.8	123.0	123.0
Sioux Falls, S. D.	106.2	103.8	106.8	107.8	105.1	104.0	100.8	101.4	102.2	103.3	103.3	103.7	102.0	104.0	104.4	110.8	112.3	110.4	116.4	118.3
South Bend, Ind.	102.8	98.7	94.7	94.9	96.2	97.6	98.5	103.7	102.9	104.6	104.5	107.8	115.3	114.8	117.8	120.6	128.4	130.9	131.2	132.3
Spokane, Wash.	105.2	105.2	106.4	101.0	96.4	97.8	98.2	100.9	101.4	101.4	101.5	102.2	110.8	110.3	111.5	115.1	115.4	121.7	121.1	.....
White Plains, N. Y.	100.8	99.4	.....	99.1	99.1	98.4	97.2	99.0	100.1	99.8	97.1	100.1	112.7	114.2	117.0	123.7	124.3	126.0	126.2	127.8

	1938				1939				1940				1941				1942			
	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May.	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.
Albuquerque, N. M.	103.7	104.1	104.7	103.0	102.6	100.9	100.8	99.5	98.6	97.8	98.6	106.5	109.9	110.5	112.2	122.7	.....	.....	128.2	.....
Charleston, W. Va.	108.5	103.8	103.0	102.7	102.3	102.0	101.4	101.9	101.9	102.1	101.3	104.0	107.0	109.8	108.8	113.8	115.0	117.2	123.5	123.5
Cincinnati, Ohio	104.3	.....	102.2	97.9	96.3	96.6	96.3	97.4	96.7	96.5	97.4	100.5	100.3	99.4	103.4	111.0	111.1	113.1	111.9	112.0
Cleveland, Ohio	103.4	.....	100.8	100.9	101.1	101.9	102.1	107.6	106.9	105.3	108.4	109.3	108.2	112.8	114.1	116.9	117.7	119.5	119.6	119.5
Columbus, Ohio	99.5	99.5	103.5	100.2	99.4	98.7	98.3	101.0	101.4	101.5	100.6	103.4	104.3	107.5	111.4	115.6	115.7	116.9	117.2	117.6
Dallas, Tex.	.....	101.3	102.9	100.4	98.3	95.4	94.9	93.2	94.6	94.5	94.6	105.2	115.7	117.3	119.2	131.5	134.3	128.3	128.0	128.8
Houston, Tex.	101.9	100.3	102.1	100.8	100.6	100.7	100.2	99.9	101.0	100.5	96.8	110.7	112.8	113.9	116.0	127.8	132.0	123.9	123.7	125.2
Jackson, Miss.	105.9	106.7	106.2	105.9	105.1	103.3	103.0	105.1	105.4	106.3	106.3	103.5	105.9	108.2	110.6	110.5	112.1	110.4	111.9	111.9
Little Rock, Ark.	99.5	99.5	99.2	100.1	100.1	100.9	100.6	99.8	99.8	99.6	98.9	100.5	100.0	100.0	101.6	102.2	102.4	102.2	109.0	109.0
Los Angeles, Calif.	106.7	103.9	103.6	99.3	98.2	96.0	95.0	96.3	95.4	95.3	95.4	99.9	100.1	100.9	105.5	109.2	113.3	113.5	113.2	.....
Louisville, Ky.	101.5	98.8	99.9	100.8	100.8	101.0	100.7	104.0	104.1	104.8	104.4	104.8	121.0	127.3	129.0	135.8	138.1	137.9	140.3	140.3
Memphis, Tenn.	102.1	102.4	101.8	103.1	104.7	102.5	101.2	104.0	103.7	103.6	102.8	106.2	116.5	115.4	118.6	121.0	125.1	125.8	126.6	126.7
Nashville, Tenn.	100.2	97.9	99.2	99.7	99.0	97.3	96.6	97.9	97.0	96.4	95.1	103.2	107.9	111.2	114.0	118.3	120.4	121.5	121.4	121.4
New Orleans, La.	106.9	107.2	105.4	104.3	102.2	101.2	101.4	105.3	104.8	103.6	102.5	108.2	109.3	111.6	114.3	114.3	116.0	115.8	116.2	116.1
Philadelphia, Pa.	104.6	105.2	102.5	101.8	102.0	102.6	103.8	105.6	105.8	107.4	110.0	119.4	119.3	119.3	124.8	136.0	139.1	145.9	145.5	143.4
Phoenix, Ariz.	106.9	104.9	103.6	103.3	98.3	96.5	97.9	99.4	99.0	99.0	99.0	106.0	107.9	108.5	113.5	117.9	119.0	120.5	120.5	.....
Pittsburgh, Pa.	107.8	111.2	107.3	106.0	106.9	106.1	106.6	105.9	103.5	101.5	101.8	106.5	112.1	113.7	120.8	120.7	120.7	132.2	128.3	129.2
Reno, Nev.	103.2	101.9	102.1	102.2	102.3	102.1	102.3	104.3	105.0	105.5	105.5	104.9	109.0	111.3	111.5	119.3	119.7	121.5	121.5	.....
San Antonio, Tex.	105.2	104.5	104.5	102.3	101.5	101.4	101.2	98.1	96.4	94.8	94.5	100.7	113.4	113.6	115.5	131.4	132.6	127.6	127.4	128.5
San Diego, Calif.	106.9	102.6	102.3	102.0	101.4	100.3	98.2	95.9	95.0	93.1	93.2	107.0	106.4	106.7	111.9	123.1	124.1	125.0	126.3	.....
San Francisco, Calif.	103.3	103.0	101.3	103.4	103.8	103.1	102.5	102.3	102.4	102.1	101.5	103.1	103.3	105.4	112.3	114.3	118.9	121.6	121.6	.....
Wheeling, W. Va.	.....	103.7	99.6	99.0	102.1	103.9	104.1	104.6	104.3	104.6	100.1	107.6	106.0	109.0	109.7	114.3	116.4	122.7	122.7	122.0
Wilmington, Del.	106.5	106.5	106.2	106.2	103.7	100.7	97.5	97.0	97.0	94.2	93.9	107.8	108.6	111.4	119.5	126.6	134.9	.....	135.4	135.4

	1938				1939				1940				1941				1942			
	Mar.	June	Sept.	Dec.	Mar.	June	Sept.	Dec.	Mar.	June	Sept.	Dec.	Mar.	June	Sept.	Dec.	Mar.	June	Sept.	Dec.
Asheville, N. C.	108.2	103.9	101.8	101.5	101.7	97.5	97.1	102.3	100.0	99.6	98.8	106.4	115.1	114.2	115.6	118.8	118.8	120.1	120.1	119.7
Atlanta, Ga.	102.7	103.1	100.2	99.1	96.5	95.5	94.9	97.5	97.4	96.5	96.6	108.7	114.8	117.6	121.5	122.6	122.7	122.3	122.5	122.7
Baltimore, Md.	100.4	98.2	97.6	96.9	96.8	98.3	97.5	99.6	98.4	98.4	101.8	117.2	126.1	127.6	128.0	130.1	130.6	131.9	132.6	131.9
Birmingham, Ala.	109.2	109.2	105.4	102.0	101.9	95.5	92.7	93.4	93.6	91.2	95.9	109.5	115.0	116.8	125.6	127.9	128.7	128.7	128.7	127.7
Boston, Mass.	99.3	97.5	101.0	102.4	102.3	100.9	101.7	103.1	104.1	104.0	104.1	107.0	108.5	112.1	114.3	118.0	120.2	123.0	120.1	120.1
Chicago, Ill.	103.2	101.5	100.0	100.5	100.4	100.6	99.5	99.8	99.8	99.6	100.6	101.4	104.3	108.4	114.4	115.6	116.7	116.7	118.2	118.2
Columbia, S. C.	100.0	100.5	102.4	102.8	101.8	100.6	99.3	98.3	99.5	98.0	98.4	114.7	116.6	120.6	124.9	128.3	131.9	132.2	132.2	132.1
Cumberland, Md.	101.8	100.6	100.1	98.9	100.4	100.6	99.5	99.5	102.3	.....	.....	105.9	110.1	109.1	113.8	114.2	114.1	120.5	122.1	122.1
Denver, Colo.	104.3	102.8	104.4	102.2	101.0	101.4	99.8	98.9	98.9	96.8	97.5	100.6	103.3	102.6	107.4	108.5	110.1	110.5	111.8	111.5
Hartford, Conn.	99.8	97.0	99.5	100.7	100.5	100.1	100.0	101.1	101.7	103.1	100.8	106.3	110.1	113.4	122.8	123.4	128.3	130.0	129.9	129.9
Manchester, N. H.	99.0	98.1	98.8	101.1	100.2	98.8	97.0	97.9	98.1	98.1	98.6	104.6	105.6	107.0	107.1	108.6	108.9	108.9	109.2	109.2
Milwaukee, Wis.	103.2	102.4	102.4	102.4	106.7	107.0	106.2	107.9	108.2	108.4	111.6	118.6	120.9	123.5	131.2	133.9	139.8	139.8	145.2	146.2
New Haven, Conn.	102.2	99.5	99.5	99.5	99.7	99.1	100.5	102.6	103.6	103.9	103.9	108.4	111.4	117.8	126.3	127.0	129.0	130.9	131.1	131.1
Oklahoma City, Okla.	127.4	127.2	126.9	128.0	128.2	127.7	128.4	130.7	131.8	133.3	132.8	139.2	143.6	142.7	154.0	169.3	169.3	174.9	178.7	178.7
Omaha, Nebr.	101.3	100.9	100.8	99.2	100.4	100.3	103.1	105.5	106.8	106.4	102.6	103.6	106.7	109.1	108.9	109.1	111.0	112.1	121.1	122.4
Oshkosh, Wis.	104.7	104.7	102.4	102.3	101.8	102.7	102.4	100.7	102.5	101.1	101.4	108.6	111.6	112.6	120.1	122.2	125.1	125.2	133.6	133.6
Peoria, Ill.	103.8	103.8	100.3	99.8	99.8	101.6	102.9	107.1	108.9	109.8	110.2	110.9	112.6	113.0	119.1	119.4	119.8	119.8	119.8	119.7
Portland, Me.	104.3	103.9	99.8	98.9	99.0	99.6	98.8	98.6	98.9	98.9	99.3	99.2	101.0	102.0	102.0	103.3	103.1	103.2	103.6	103.6
Providence, R. I.	103.9	102.9	102.5	102.2	103.0	104.0	103.2	104.2	104.6	105.2	106.2	108.0	108.9	110.2	113.6	116.2	118.3	120.1	118.9	118.9
Raleigh, N. C.	104.4	104.1	101.6	101.1	100.7	95.0	93.1	99.3	96.1	96.1	99.7	102.8	105.0	105.5	116.7	118.0	125.3	125.3	125.5	125.3
Richmond, Va.	106.0	104.3	100.4	100.9	100.9	98.0	98.9	98.4	96.3	95.7	98.3	107.6	110.6	111.2	118.1	118.0	117.9	119.5	118.6	118.6
Roanoke, Va.	102.8	102.8	103.4	103.5	104.5	104.7	104.8	105.5	105.7	105.8	.....	116.1	122.4	120.7	122.6	125.1	128.1	130.4	125.0	125.2
Rutland, Vt.	104.5	103.4	101.0	99.6	99.6	98.8	97.5	96.0	96.9	97.0	98.8	99.1	107.1	107.7	115.0	115.8	120.2	121.7	124.4	124.4
Springfield, Ill.	120.6	120.6	118.0	118.0	118.0	117.6	117.4	122.5	122.4	123.7	124.1	128.4	129.3	129.3	135.8	136.5	135.5	135.5	134.2	134.2
Tampa, Fla.	102.6	101.6	100.4	99.9	100.3	101.0	101.1	103.4	103.9	102.8	103.6	109.2	111.5	111.4	112.0	112.8	113.8	114.0	119.4	.....
Washington, D. C.	108.9	109.0	106.1	106.5	105.8	102.9	104.4	104.4	104.4	104.3	107.2	116.7	113.5	112.3	112.3	116.4	121.6	125.9	125.9	125.9
Wichita, Kan.	101.8	105.2	.....	106.9	109.1	108.0	107.7	103.9	103.3	104.7	.....	102.5	103.8	108.6	109.8	114.3	116.2	117.1	117.8	122.2

Are you taking advantage of LINDE AIDS to conserve Oxy-Acetylene Equipment and Supplies?

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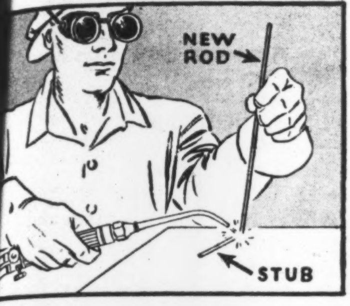
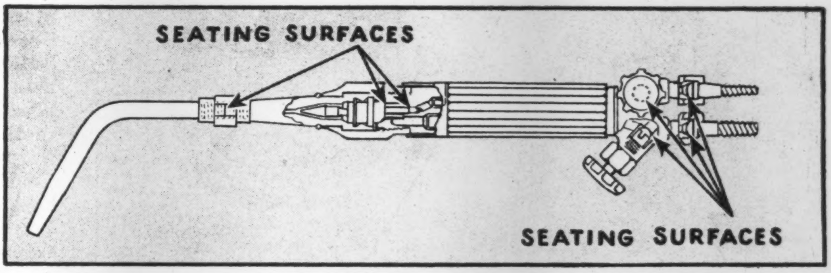
FOR OUTSTANDING
PRODUCTION ACHIEVEMENT

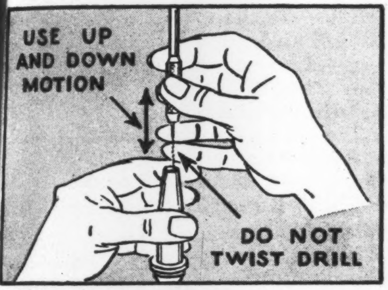
The Linde organization supplies without charge booklets, manuals, and reprints to help make oxy-acetylene apparatus, gases, and supplies go further. One of the most useful of these is the booklet, "Precautions and Safe Practices." Some of the main points to bear in mind in your efforts toward conservation of these vital materials are outlined below. More specific information, as well as "Precautions and Safe Practices," can be obtained by sending the coupon.



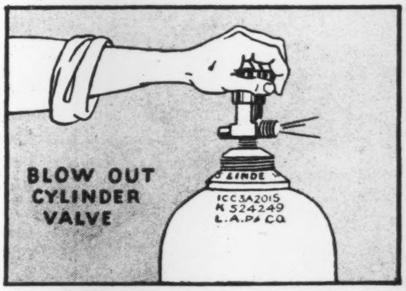
***Welding Rod*—Use up stub ends by tacking them to new rod—Don't over-reinforce the weld—Don't use bronze rod if another kind will do—Reduce to minimum tolerances bronze deposits to be machined—Reduce the number of rod sizes you order by selecting an average suitable for many applications.**



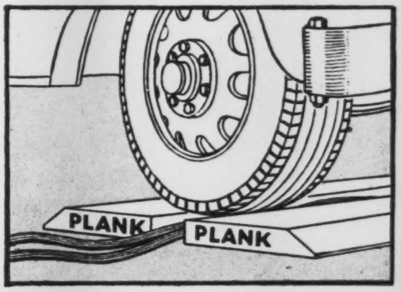
***Blowpipes*—Keep seating surfaces clean and gas tight—Never tighten a welding head onto a blowpipe by twisting the stem—Always use a wrench, not pliers, in making connections where a nut is provided—Don't use blowpipes as hammers or for any purpose other than those for which they are intended—Determine and correct cause of flashbacks before using apparatus further.**


USE UP AND DOWN MOTION
DO NOT TWIST DRILL

***Hand-Cutting Nozzles*—Keep gas passages clear with correct size of drill—Occasionally use Oxweld Nozzle Cleaning Compound—Square up flame end of nozzles by rubbing them on emery cloth—If a nozzle is bent, straighten it carefully—Clean nozzle seats to remove scale and eliminate dents.**



***Regulators*—Blow dust out of cylinder valves before connecting regulators—Always release gas pressure from regulators when equipment is not in use—To prolong life of the diaphragm, release pressure-adjusting screw after relieving pressure—Test for and replace leaky valve seats periodically—Replace broken gauge crystals.**



***Hose*—If hose must cross the path of vehicles, protect it with planks—Protect hose from oil and grease—Avoid kinks and abrasion—Test hose and connections regularly for leaks—Repair leaky hose with Oxweld hose splices—Do not use tape—Use short lengths of hose—Purchase hose only when actually needed.**

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Type...........	Type...........	Type...........

Name..

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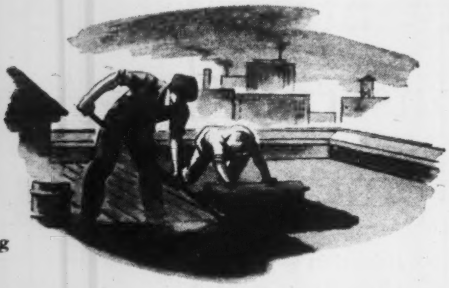
In Canada: Dominion Oxygen Company, Limited, Toronto

The words "Linde," "Oxweld," "Purox," and "Prest-O-Weld" are trade-marks.



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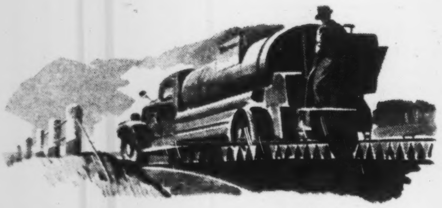

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- Sluice Gates
- Tar
- Tarmac Road Tars
- Ties—Treated
- Valves—All-Iron Goggle
- Waterproofing Materials

KOPPERS COMPANY and Affiliates,
Pittsburgh, Pa.

Contract Unit Bid Prices

Selected list of 84 projects showing how contractors bid in 1942-1943

INDEX TO PROJECTS COVERED

Project Page

DAMS

Davis Dam and Powerhouse, Arizona-Nevada 161
Core Borings, Liberty Dam, Md. 162
Raising Ross Dam, Seattle, Wash. ... 166

AIRPORTS

Airport Paving, New Jersey 168
Airport Construction, New York 168
Paving Chemung County Airport, N. Y. 170
Airport Paving, Drainage, and Grading, Pa. 170
Airport Paving and Grading, Mo. ... 172
Airport, Texas 172

STREETS AND HIGHWAYS

Street Paving, Chicago, Ill. 174
Paving and Widening Street, Pa. 174
Industrial Expressway, Detroit, Mich. 176
Highway Improvements, Arizona 176
Highway, Arkansas 178
Highway, California 178
Highway, California 178
Highway, California 180
Highway Relocation, Connecticut 180
Highway, Georgia 180
Highway, Franklin County, Georgia. 182
Highway Paving, Iowa 182
Highway, New Jersey 182
Highway, New Jersey 186
Highway, New Mexico 186
Highway, Kentucky 186
Highway, Michigan 188
Highway, Nevada 188
Highway Grading and Culverts, Mo.. 190
Highways, Virginia 190
Project Page
Highway, Virginia 190
Highway, Virginia 192
Highway Surfacing, Utah 192
Highway, West Virginia 192
Highway Improvements, North Dakota 194
Highway, Pennsylvania 194
Highway, Tennessee 194
Highway, Wisconsin 196
Highway, Wisconsin 196
Highway, Texas 196
Highway Improvement, North Carolina 198
Highway, Nebraska 198

BRIDGES

Highways and Bridges, Oklahoma ... 198
Cloverleaf Bridge and Highway, Md.. 200
Highway and Bridge, Missouri 202
Highway and Bridges, Pennsylvania. 202
Highway and Bridge, Mississippi 202
Bridges, Texas 204
Highway Bridge, Texas 204
Bridge Piers, Texas 204
South Western Ave. Bridge Alterations, Chicago, Ill. 206
Willamette River Bridge, Oregon ... 206
Bridge, West Virginia 206
Bridge and Approaches, Tennessee.. 208
Highway Bridge, California 208
Bridge Substructure, New Jersey 208
Bridge and Approaches, Georgia 210
Highway Bridges, Maryland 210
Bridge, Georgia 210
Bridge, Kentucky 212
Bridge, North Carolina 212
Bridge Improvements, Oklahoma 212
Project Page
Bridge, Maryland 212
Grade Crossing Elimination, Franklin County, Ohio 214
Grade Crossing Elimination, Summit County, Ohio 216
Grade Separation, California 218
Concrete Overpass, Utah 218
Directional and Pedestrian Islands, Washington, D. C. 218

WATERWORKS

El Monte Pipeline, San Diego, Calif.. 220
Water Distribution System, Wash... 220
Water Supply Lines, Seattle, Wash... 222
Water Supply System, New York 222
Water Mains, Detroit, Mich. 224
Waterworks Improvements, Oklahoma 224
Water Tunnels, Chicago, Ill. 226

SEWERAGE

Storm and Sanitary Sewer, Calif. 226
Sanitary Sewer, Missouri 226
Sewerage System, New Jersey 226
Sewer, New Jersey 228

MISCELLANEOUS

Rail Removal and Resurfacing Streets, Seattle, Wash. 230
Track Removal, Street Repairs, Seattle, Wash. 230
Earthwork and Tunnel, New Mexico. 230
Pedestrian Passageways, Subways, Chicago, Ill. 230
Subway, Chicago, Ill. 234
Pedestrian Subway Approaches, Chicago, Ill. 234

DAVIS DAM AND POWERHOUSE ARIZONA-NEVADA

OWNER: Bureau of Reclamation, Davis Dam Project, Arizona-Nevada, Kingman, Ariz. S. O. Harper, chief engineer.

PROJECT: Construction of Davis Dam, an earth- and rock-fill dam across Colorado River, approximately 30 miles west of Kingman, Ariz.; and diversion channel through left abutment which forms forebay with concrete penstock, outlet and spillway structures across downstream end of forebay channel. Crest of dam to be 138-ft. above river bed, 1,600-ft. long, and 50-ft. wide. Impervious central portion of dam embankment to consist of moistened and rolled embankment of clay, sand and gravel with blanket of same material extending over entire upstream portion of dam foundation. Embankments immediately up- and downstream from impervious portion will be semi-pervious, consisting of moistened and rolled rock screenings, with blanket of same material on entire downstream portion of dam foundation. Up- and downstream portions of embankment to be rock filled. Contract also includes cut-off trench, concrete cut-off walls, concrete penstock structures enclosing welded plate steel penstocks, trashracks, fixed-wheel gates, gantry crane, elevator tower, outlet structure between penstock and spillway structures, and spillway structure at left side of downstream end of forebay. Powerhouse to be located on left bank of river at downstream toe of penstock structure. It is to be of reinforced concrete, 110 x 448-ft., and to house five main generating units, station-service equipment, offices and other facilities.

CONDITIONS: Contractor to furnish sand, rock or gravel for concrete; sand for mortar and grout; sawdust, screened gravel for embedding drain pipes, under fill back of gravity wall, and roof covering; aggregate for porous concrete, roads and parking areas; rock and rock spalls; lumber for temporary tunnel timbering; form materials; wire (except insulated wire); nails; temporary metal supports; curing compound; oakum; welding electrodes and brazing rods; and other materials not part of completed structure, but necessary for completion. Government to furnish all other materials. Completion time, 1,200 calendar days. Rail facilities available to Kingman, Ariz., and highway to vicinity of dam site. Wage rates are: skilled labor, \$1.12½ to \$1.65 per hr.; semi-skilled, 87½c. to \$1.12½; and common 82½c. to 90c. No adjustment for increased wage rates will be made during the first year of the contract, but beginning at the thirteenth month, the amounts due for labor rates will be adjusted by the amount of 60 percent of the difference between the wages actually paid, and the wages which would have been paid if present wages were in effect.

BIDS: Two bids were received May 15, 1942, the contract low of \$18,996,392 and \$19,313,434.

LIST OF BIDDERS:

1. Utah Construction Co., San Francisco, Calif. (contract) \$18,996,392
2. Davis Dam Constructors, Los Angeles, Calif 19,313,434

Item	Quan.	Unit Prices	
		(1)	(2)
1. Diversion, care of river, and unwatering foundations	L. S.	\$800,000.00	\$198,928.00
2. Excav., stripping sand and coarse aggregate deposit	200,000 c. y.	.24	.50
3. Excavation, stripping borrow pits	40,000 c. y.	.24	.50
4. Common excav., for diversion and forebay channel, and for road betw. dam embank. and penstock struct	545,000 c. y.	.30	1.00
5. Common excav., for penstock, outlet, spillway struct. and powerhouse	425,000 c. y.	.50	1.00

6. Rock excav., for diversion and forebay channel, for road betw. dam embank. and penstock struct, and above El. 520 for powerhouse and penstock, outlet and spillway struct	2,100,000 c. y.	2.50	2.45
7. Rock excav. below El. 520 for powerhouse and penstock, outlet and spillway struct	230,000 c. y.	5.00	3.00
8. Drill line holes for rock excav	160,000 l. f.	.55	.75
9. Excav., all classes, in grouting and drainage tunnel and shaft	700 c. y.	24.00	50.00
10. Excav., common, dam embank. fndn., above El. 455	955,000 c. y.	.50	.75
11. As above, below El. 455	40,000 c. y.	1.00	6.00
12. Rock excav.: footings of conc. cut-off walls under dam embankmt	600 c. y.	31.50	35.00
13. Excav., rock: open cut-off trench under dam embank. on east abut	800 c. y.	11.00	35.00
14. Common excav.: embank. toe drains	60 c. y.	2.50	15.00
15. Rock excav.: embank. toe drains	40 c. y.	11.00	35.00
16. Common excav.: switchyard	20,000 c. y.	.85	1.00
17. Rock excavation: switchyard	40,000 c. y.	.85	1.50
18. Com. excav.: control-cable gallery, trench	700 c .y.	2.50	5.50
19. Rock excav.: control-cable gallery, trench	700 c. y.	11.00	20.00
20. Fills back of gravity walls, for switchyard, and betw. pow. house and outlet struct	130,000 c. y.	.55	.25
21. Rock fill on fill back of grav. walls and on fills for switchyard	50,000 c. y.	.45	.25
22. Sand and gravel filter blanket under riprap	18,000 c. y.	1.80	1.00
23. Riprap	87,000 c. y.	.85	2.00
24. Road and parking-area surfacing	4,300 c. y.	2.50	3.00
25. Com. excav., borrow pits and transport to dam embankment	1,530,000 c. y.	.45	.30
26. Loading and hauling stockpile mat'l	1,940,000 c. y.	.32	.25
27. Separate, load, haul stockpiled mat'l	1,200,000 c. y.	.55	.35
28. Earth fill in dam embankment	1,300,000 c. y.	.11	.15
29. Rock screenings in dam embankment	730,000 c. y.	.11	.15
30. Rock fill in dam embankment	2,200,000 c. y.	.075	.15
31. Rubble-masonry walls	800 c. y.	26.00	30.00
32. Rubble-concrete paving	500 c. y.	26.00	20.00
33. Drill holes for setting fdn. drain. pipes	150 ea.	8.50	50.00
34. Drill drainage holes, under 25 ft. in fndn.	6,000 l. f.	5.75	2.50
35. As above, 25 to 50 ft. deep	1,000 l. f.	5.75	3.00
36. 6-in. sew. pipe drain, uncemented joints, embedded in gravel	400 l. f.	.75	2.50
37. 8-in. as above	7,000 l. f.	1.00	2.50
38. 12-in. as above	200 l. f.	1.20	2.50
39. 4-in. as above, embedded in porous conc.	None	....	....
40. 6-in. as above, embedded in porous conc.	None	....	....
41. 12-in. as above, embedded in porous conc.	2,400 l. f.	6.50	4.50
42. 6-in. sew. pipe with cemented joints	600 l. f.	1.10	3.00
43. 12-in. sew. pipe with cemented joints	600 l. f.	1.35	4.50
44. Lay 18-in. concrete pipe	400 l. f.	1.60	5.25
45. 5-in. porous concrete tile drains	7,000 l. f.	1.30	1.00
46. Single porous concrete half-tile drains	20,000 l. f.	1.30	1.00
47. Double porous concrete half-tile drains	6,000 l. f.	1.70	1.50
48. Porous conc. under spillway and outlet struct	None	....	....
49. Screened gravel under fill back of grav. wall	200 c. y.	3.75	5.00
50. Drilling weep holes	1,000 l. f.	1.10	5.00
51. Core drilling 5½-in. holes to 30-ft	1,600 l. f.	11.50	20.00
52. Drill 1⅜-in. grout holes to 30-ft	50,000 l. f.	2.25	2.75
53. As above, 30 to 50-ft	100,000 l. f.	2.65	2.75
54. As above, 50 to 100 ft	10,000 l. f.	2.65	2.75
55. As above, 100 to 150 ft	10,000 l. f.	2.65	4.00
56. As above, 150 to 200 ft	100,000 l. f.	2.65	4.50
57. As above, 200 to 250 ft	5,000 l. f.	3.30	7.50
58. Place pipe and fittings for fndn. grouting and drainage	100,000 lb.	.19	.15
59. Place metal tubing and fittings for grouting contraction joints	30,000 lb.	.27	.25
60. Pressure grouting foundations	300,000 c. f.	1.60	1.50
61. Pressure grouting with packers	50,000 c. f.	3.20	2.00
62. Pres. grouting contract. joints and cooling system	2,000 c. f.	3.00	2.50
63. Drill holes for anchor bars and grouting bars in place	115,000 l. f.	1.05	1.00
64. Conc. in floor of forebay chan. and of temp. diversion chan. through spillway	12,500 c. y.	13.00	15.00
65. Conc.: slope paving of forebay channel	23,000 c. y.	22.00	25.00
66. Conc. in penstock struct. below El. 647, except trashracks, elevator tower	150,000 c. y.	7.00	8.00
67. Conc. in penstock struct. above El. 647, except elevator tower	6,500 c. y.	12.50	15.00
68. Concrete in trashracks	6,000 c. y.	35.00	35.00
69. Conc. in elev. tower and gate-erection tower	600 c. y.	60.00	35.00
70. Conc.: grouting and drain. tunnel and shaft	300 c. y.	30.00	28.00
71. Conc.: piers, walls of outlet struct., and spillway struct	55,000 c. y.	12.00	8.00
72. Conc.: radial-gate sill, spillway crest	57,500 c. y.	7.50	15.00
73. Conc.: floor of outlet and spillway struct.	17,500 c. y.	8.00	15.00
74. Conc.: bridges and walks of spillway struct. and in operating floors of outlet struct	1,000 c. y.	40.00	35.00
75. Conc.: superstructure of spillway	2,000 c. y.	35.00	35.00
76. Concrete in blockouts	400 c. y.	25.00	10.00
77. Make and place conc. stop logs in spillway struct	600 c. y.	25.00	50.00
78. Conc. in bulkhead gates and supporting columns for radial-gate openings in outlet structure	200 c. y.	25.00	50.00
79. Concrete in gravity walls	15,000 c. y.	10.50	8.00
80. Conc.: substructure of powerhouse	35,000 c. y.	15.00	15.00
81. Conc.: intermediate struct. of powerhouse	19,800 c. y.	22.00	25.00
82. Conc.: superstructure of powerhouse	9,900 c. y.	35.00	43.00
83. Second-stage conc. in powerhouse	18,500 c. y.	17.00	10.00
84. Conc.: footings of embank. cut-off walls	500 c. y.	15.00	17.50
85. Conc. in embank. cut-off walls (exc. footings)	400 c. y.	30.00	17.50
86. Conc.: parapet and curb walls on dam embank	850 c. y.	55.00	17.50
87. Concrete in control-cable conduit	1,600 c. y.	40.00	17.50
88. Conc. in precast-conc. cable-tray supports in control-cable conduit	20 c. y.	100.00	30.00
89. Placing reinforcement bars	14,000,000 lb.	.026	.03
90. Place metal tubing and fittings for conc.-cooling system	250,000 lb.	.11	
91. Cooling concrete	180,000 c. y.	.45	
92. Chip and roughen concrete surfaces	2,000 s. y.	4.00	
93. Finishing lighting recesses	165 ea.	5.00	
94. Place metal sealing strips	25,000 l. f.	.50	
95. Place metal cover plates over vent grooves	2,500 l. f.	.60	
96. Place rubber water stops	500 l. f.	.90	
97. Placing joint filler	58,000 s. f.	.25	
98. Construct control joints	300 l. f.	1.00	
99. Construct asphalt seals	2,100 l. f.	3.00	
100. Insulate rein. bars and electr. metal conduit	20,000 sect.	.15	
101. Place roofing on main powerhouse roof	32,000 s. f.	.50	
102. Place insulation, low roof of powerhouse	16,000 s. f.	.40	
103. Place asph. saturated felt roofing, incl. flashing	20,000 s. f.	.25	
104. Place membrane waterproofing and rein. fabric and joint mat'l. in conc. cover slab over memb. waterpr'f'g	10,800 s. f.	.30	
105. Dampproofing outside powerhouse walls	1,800 s. y.	.60	
106. Inst. gate frames and guides for fixed-wheel and bulkhead gates	943,000 lb.	.06	
107. Inst. fixed-wheel gates and metalwork for gate counterweights and gate-erection tower	2,245,000 lb.	.035	
108. Install bulkhead gates	270,000 lb.	.035	
109. Inst. gate hoists, spillway fixed-wheel gates	555,000 lb.	.025	
110. Inst. gate hoists, penstock fixed-wheel gates	375,000 lb.	.035	
111. Inst. stop-log guides, slide plates, seal supports	390,000 lb.	.045	
112. Install trashracks	1,140,000 lb.	.035	
113. Install penstocks	1,625,000 lb.	.035	
114. Inst. draft-tube pier noses	155,000 lb.	.03	
115. Erect. str. steel roof framing and crane-runway beams for pow'hse	850,000 lb.	.03	
116. Install track rails	268,000 lb.	.03	
117. Install cranes	1,482,000 lb.	.02	
118. Inst. std. metal pipe, fittings and valves. under 6-in	135,000 lb.	14	
119. As above, over 6-in. dia	250,000 lb.	.05	
120. Install metal stairways	30,000 lb.	.08	
121. Inst. metal frames for hatchways, manholes, floor plates and grating	31,200 lb.	.13	
122. Inst. metal gratings and covers for floor openings	43,200 lb.	.03	
123. Install metal inserts	12,500 lb.	.23	
124. Inst. oil-storage tanks and accessories	75,000 lb.	.02	
125. Install pumps	15,000 lb.	.07	
126. Install miscellaneous metalwork	96,600 lb.	.20	
127. Construct timber guard rails	26 M bm.	50.00	
128. Inst. embedded elec. metal conduit, to 1¼-in. dia	40,000 l. f.	.50	
129. As above, 1¼ to 3-in	24,000 l. f.	.75	
130. As above, over 3-in. dia	900 l. f.	1.00	
131. Inst. elec. non-metallic conduit	6,000 l. f.	.80	
132. Inst. ground wires and ground rods	20,000 lb.	.10	
133. Inst. elec. cable for resistance thermometers, strain meters, and joint meters embedded in concrete	8,000 l. f.	.30	
134. Inst. copper tubing for hydraulic pressure piezometers	2,500 l. f.	.40	
135. Transport freight of all kinds for Govt. or agents, other than contractor, between railroad and dam site	13,300 ton	4.00	4.00
136. Constr. 24-in. sew. pipe drains, with uncemented joints, embedded in gravel	250 l. f.	2.50	3.00
137. Lay 24-in. sew. pipe with cemented joints	100 l. f.	2.50	3.00

CORE BORINGS
LIBERTY DAM, MARYLAND

OWNER: City of Baltimore, Board of Awards, Baltimore, Md. Leon Small, water engineer.

PROJECT: Earth and rock core borings for Liberty Dam on the North Branch of the Patapsco River, Baltimore and Carroll Counties, Md.

CONDITIONS: Contractor to furnish all materials and complete work in 90 consecutive calendar days. Rail and highway transportation facilities available. Wage rates (Baltimore) are: skilled labor, \$1.37½ to \$1.80; and common labor, 70c.

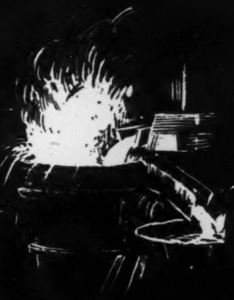
BIDS: Three bids were received September 9, 1942, ranging from the contract low of \$26,400 to \$29,816.

LIST OF BIDDERS:

1. Sprague & Henwood, Scranton, Pa. (contract)	\$26,400
2. Riley Engineering & Drilling Co., Brooklyn, N. Y	27,383
3. Giles Drilling Corp., New York, N. Y	29,816

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Earth borings for 2⅛-in. or larger cores	300 l. f.	\$8.25	\$8.60	\$9.47
2. Earth borings for 8-in. or larger cores	50 l. f.	12.00	12.01	12.00
3. Rock borings, 2⅛-in. or larger	2,500 l. f.	8.25	8.60	9.47
4. Rock borings, 8-in. or larger	225 l. f.	12.00	12.01	12.00

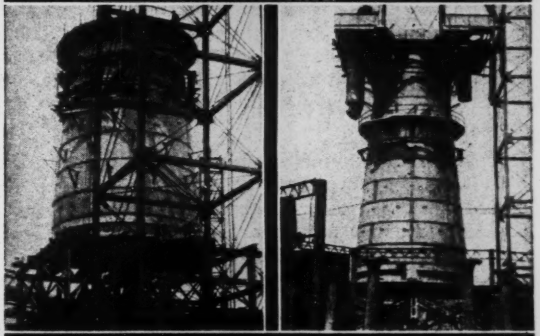
THOUSANDS OF
TONS OF STEEL
FOR GUNS, TANKS
AND VITAL WAR
EQUIPMENT
MADE AVAILABLE



EICHLEAY MOVES BLAST FURNACE

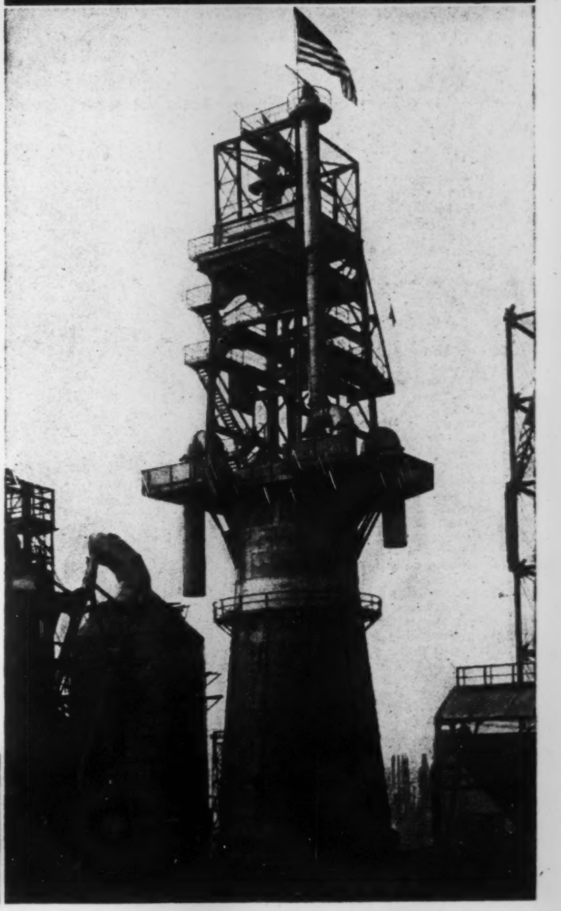
Cuts Replacement Time in Half

Showing the movable steel platform on which the new furnace was erected.



The new furnace in process of construction 112 ft. from its final position.

Entire unit being moved by Eichleay to its permanent location.



Saving valuable time and production, Eichleay moved this Blast Furnace, which was erected on a moveable steel platform, a distance of 112 ft. to its final location.

Instead of the usual replacement time of 150 days, only 83 days elapsed between the time the fire was drawn in the old unit and the new furnace blown in.

Additional thousands of tons of pig iron were thus made available for weapons of war.

**BUILDING MOVING • UNDERPINNING
RIGGING • PLANT CONSTRUCTION •
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FOUNDATIONS • MACHINERY MOVING**

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EICHLEAY ENGINEERING CORPORATION
PITTSBURGH, PA.

RAISING ROSS DAM—SEATTLE, WASHINGTON

OWNER: City of Seattle, Department of Lighting, E. R. Hoffman, superintendent.

PROJECT: Clearing portion of Ruby Basin, and constructing second step of Ross Dam (concrete arch dam) across Skagit River in Whatcom County, Washington. Existing structure (first step) consists of twelve sections, each approximately 50-ft. long. Two end sections are complete to El. 1300, and ten center sections to El. 1365, forming a gravity dam sealed against abutments at either end with concrete wing walls upstream from permanent dam face. Dam surmounted by timber crib 15-ft. high. Crest of timber crib is at El. 1380.15; overflow spillway length is 455 ft. Under this contract, abutments to be excavated and end sections completed to El. 1385, after which timber crib is to be removed. Contractor is then to raise entire dam at uniform rate, keeping alternate sections high, with no section to be more than 20-ft. higher than adjoining section.

CONDITIONS: City of Seattle intends to impound water behind Ross Dam as soon as construction and the strength of new concrete permits. River is subject to extreme floods, and the demand for power fluctuates. Superintendent of Lighting reserves right to designate time when 72-in. pipes and concrete plug in diversion tunnel is to be installed, and time when Ruby Lake is to be lowered to permit installation of gates, outlet pipes and trash rack. Highway transportation facilities are available, and the city's Skagit River Railroad makes connections with Great Northern at Rockport. Priority rating of project is AA-2X. Time for completion is 555 calendar days. Owner is to furnish 72-in. steel pipe; manhole rings and covers; cable for strain meters (3 and 4 conductor); companion halves to grout outlets already installed. Speci wage rate minimums are: skilled labor, $1.30 to $2.00 hour; semi-skilled, $1.10 to $1.55; common, $1.015 to $1.2

BIDS: Bids were originally asked for June 11, 1942. That op ing was postponed until June 18, and then postponed definitely. Later, August 6th was set as the bid date. Aug 6th bids for the raising of the dam, for cement, and for charge regulating valves, each separately, were rejected. this opening the low bid for the dam construction was 6,1 214; for cement $927,676; and for regulating valves $57,7 Three bids were received on the January 21, 1943 openi ranging from the contract low of $7,144,923 to $10,011,8 This opening included raising of the dam, cement, valves, a in addition, the plant for cooling concrete, and resistan thermometers, wire strain meters, and wire joint meters.

LIST OF BIDDERS: (August 6, 1942 opening. All bids rejected)

1a. General Constr. Co., J. F. Shea Co., Inc., and Morrison-Knudsen Co., Inc., Seattle Wash., (raising dam)	$6,146,2
1b. Superior Portland Cement, Inc., Seattle, Wash. (cement)	927,6
1c. S. Morgan Smith Co., York, Pa. (valves)	57,7

LIST OF BIDDERS: (January 21, 1943 opening)

1. General Constr. Co., J. F. Shea Co., Inc., and Morrison-Knudsen Co., Inc., Seattle, Wash. (contract)	$7,144,9
2. Guy F. Atkinson Co., San Francisco, Calif.	8,018,6
3. S. A. Healy Co., White Plains, N. Y.	10,011,8

January 21, 1943 Basis on which award was made					August 6, 1942* Bid rejected	
		Unit Prices				Unit Price
Item	Quan.	(1)	(2)	(3)	Quan.	(1)
1. Rock excavation	113,000 c. y.	$8.00	$8.80	$11.00	94,000 c. y.	$9.00
2. Drill 4-in. vertical vent hole	170 l. f.	15.00	14.00	12.50	Unchanged	Unchanged
3. Remove timber crib and end walls	Lump Sum	15,000.00	10,000.00	15,000.00	"	"
4. Drill 1½-in. grout holes, to 30-ft	8,000 l. f.	3.50	2.75	3.00	"	"
5. Drill 1½-in. grout holes, 30–50 ft	2,500 l. f.	3.50	2.75	3.00	"	"
6. As above, 50 to 100 ft	1,000 l. f.	3.50	2.75	3.00	"	"
7. As above, 100 to 150 ft	5,000 l. f.	3.50	2.75	3.00	"	"
8. As above, 150 to 500 ft	6,000 l. f.	4.50	4.00	4.00	"	"
9. Pressure grouting of foundation	5,000 c. f.	3.00	2.50	2.75	4,500 l. f.	4.00
10. Drill drainage holes, to 50 ft	2,000 l. f.	4.50	5.00	4.00	Unchanged	Unchanged
11. Drill drainage holes, 50 to 100 ft	1,500 l. f.	4.50	5.00	4.00	"	"
12. Drill drainage holes, 100 to 150 ft	1,500 l. f.	4.50	5.00	4.00	"	"
13. Furn. and install 1½-in. black welded steel pipe for foundn. grouting	2,000 l. f.	.75	.60	.75	"	"
14. As above, 2-in. pipe	3,500 l. f.	1.00	.75	1.00	"	"
15. Furn. and install 4-in. black welded steel pipe for foundn. drainage	1,600 l. f.	2.00	2.10	2.00	"	"
16. Furn. and inst. 8-in. porous conc. tile drain	15,400 l. f.	2.00	1.90	2.00	"	"
17. Furn. and inst. 20-in. split porous conc. tile drain	3,850 l. f.	6.00	5.75	6.00	"	"
18. Copper water seals, 15-in. wide, upstream face of dam	5,600 l. f.	3.00	2.50	3.75	"	"
19. Galv. iron grout stops, vertical and horizontal, 15-in. wide	12,000 l. f.	1.50	1.40	2.10	"	"
20. ½-in. std. black pipe for grouting contraction joints	25,000 l. f.	.50	.45	.50	"	"
21. As above, 1½-in. pipe	11,000 l. f.	.80	.75	.75	"	"
22. Grouting units, black, complete	2,500 ea.	3.00	2.50	3.50	"	"
23. Reinforcing steel	750,000 lb.	.08	.09	.08	750,000 lb.	.09
24. Black electrical metal conduit, to 1½-in., incl. bends and elbows; hot dipped in asphalt	5,800 l. f.	1.00	.90	.75	Unchanged	Unchanged
25. As above, 1½-in. to 3-in	4,650 l. f.	2.00	2.00	1.20	"	"
26. As above, 3½-in. diameter	1,000 l. f.	3.00	2.75	2.00	"	"
27. Elect. metal panel and pull boxes, over 10½-in. in longest dimension	1,000 lb.	1.00	1.25	1.00	"	"
28. Electrical wiring, to No. 12 A. W. G.	7,000 l. f.	.15	.12	.15	"	"
29. As above, No. 12 to No. 8 A. W. G.	1,500 l. f.	.30	.25	.20	"	"
30. Stranded elect. wiring, No. 8 to No. 00 A. W. G.	3,080 l. f.	.50	.45	.50	"	"
31. Furn., fabricate and install cables for resistance thermometers, strain meters and joint meters	40,000 l. f.	.35	.35	.50	40,000 l. f.	.40
32. Furn. electr. resistance thermometers	14 ea.	15.00	6.00	10.00	Not required in Aug. 6 opening	
33. Furn. elastic wire strain meters	255 ea.	30.00	25.00	40.00	Not required in Aug. 6 opening	
34. Furn. elastic wire joint meters	16 ea.	30.00	27.50	40.00	Not required in Aug. 6 opening	
35. 1½-in. black welded pipe railing, double rail	260 l. f.	5.00	4.00	4.00	Unchanged	Unchanged
36. Extension of gaging well	Lump. Sum	9,000.00	1,000.00	6,353.52	"	"
37. Roughen surface of existing dam	64,500 s. f.	.60	.75	.50	"	"
38. Cement — EA-C 150 Type II (bulk)	470,000 bbl.	2.60	2.85	3.25	Bid separately in Aug. 6 opening	
39. Cement — EA-C 150 Type II (cloth sack)	1,000 bbl.	3.00	3.60	3.50	Bid separately in Aug. 6 opening	
40 Cement — EA-C 150 Type II (paper bag)	3,000 bbl.	3.20	3.40	3.30	Bid separately in Aug. 6 opening	
41 Cement - EA-C 150 Type II (Hyurly—paper bag)	3,500 bbl.	4.00	3.90	4.00	Bid separately in Aug. 6 opening	
42 Concrete, Class A	290,000 c. y.	8.87	10.65	14.00	264,000 c. y.	11.50
43. Concrete, Class B	124,000 c. y.	8.87	10.65	14.00	113,000 c. y.	11.50
44 Concrete cooling pumping plant	Lump Sum	50,000.00	25,000.00	90,100.00	Not required in Aug. 6 opening	
45 Electrical energy used for pumping cooling water	1,500,000 kw. hr.	.04	.01	.02	Not required in Aug. 6 opening	
46. Metal tubing and fittings for conc. cooling system	340,000 lb.	.25	.27	.21	Not required in Aug. 6 opening	

Fighting a Universal War takes

Crushed Rock

lions of yards are needed for bar-s footings, war plants, military s, airports. Speed is important—s freedom from repairs and break-ns. Universal rock and gravel hers and crushing plants have blished records for production low maintenance costs.

nd Asphalt Maintenance

s also important. We have to con-ve what we've got—even down to ds and streets—*and manpower.* e Universal "Twin Dryer" Asphalt nt does both. Turns out specifica-n asphaltic material for patching d small paving jobs, at low cost yard. One man can turn out up 40 tons per hr.

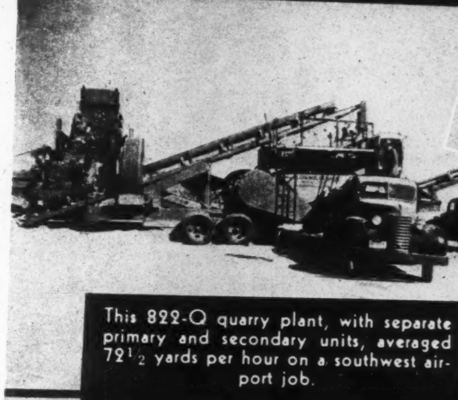
nd Smooth, Seal Coated Runways

are needed for the thousands of lots necessitated by global war; nways and landing strips for train-g use, and at defense bases. preaderollers have spread chips in ree layers—large chips first, medi-m next and small chips on top—d rolled them firm and smooth, at any air fields. Spreaderolled seal ating lasts — saves material and aintenance.

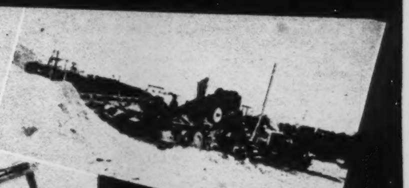
esides this essential construction d road building equipment, we are pplying pulverizers to fertilizer anufacturers and explosives plants.

And Ordnance Matériel

or the "fightingest" army in the niverse — the U. S. Army!



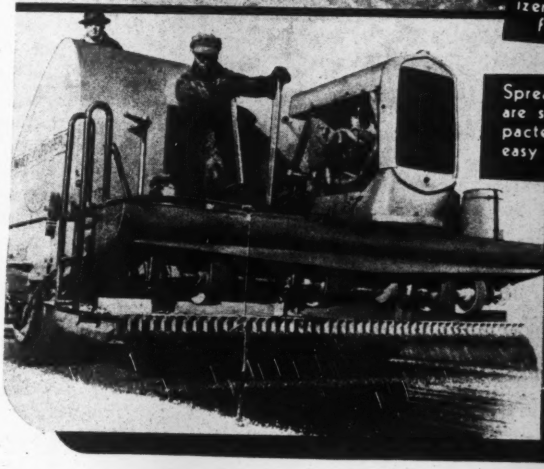
This 822-Q quarry plant, with separate primary and secondary units, averaged $72\frac{1}{2}$ yards per hour on a southwest airport job.



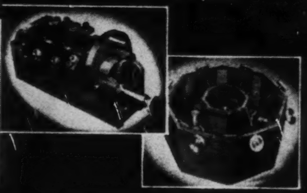
A Universal crusher grinds out road rock along the Alcan Highway — one of several Universal plants on this project.

"Twin Dryer" Asphalt Plant keeps Seattle's asphalt pavements in good shape for the duration.

Universal reduction crusher and pulverizer turns out 100 tons of aglime daily for Illinois' "Little Egypt" farmers.



Spreaderolled landing strips are smooth, thoroughly compacted, water repellent and easy to maintain at this Texas air base.



Precision dies and gages made in Universal shops for our production of ordnance parts.

UNIVERSAL ENGINEERING CORP.

(formerly Universal Crusher Co.)

633 C Ave. West, Cedar Rapids, Ia.

EVERYBODY EVERY PAYDAY AT LEAST 10%

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

	January 21, 1943 — Basis on which award was made				August 6, 1942* — Bid rejected	
Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)	Quan.	Unit Price (1)
47. Rein. concrete in valve house, Cl. C	125 c. y.	40.00	50.00	45.00	Unchanged	Unchanged
48. As above, Class D	125 c. y.	40.00	50.00	45.00	"	"
49. Cl. D rein. conc. in stairway shaft and shaft house	180 c. y.	40.00	81.00	45.00	"	"
50. Furn., install circular stairway	60 treads	10.00	15.00	25.00	"	"
51. Cl. C rein. conc. other than in valve houses	100 c. y.	30.00	40.00	30.00	"	"
52. As above, Class D	350 c. y.	30.00	40.00	30.00	"	"
53. Rein. conc. in spillway training walls	3,000 c. y.	40.00	30.00	25.00	"	"
54. Concrete, Class E	50 c. y.	40.00	16.00	50.00	"	"
55. 48-in. electrically welded steel pipe	83,500 lb.	.25	.25	.20	"	"
56. 72-in. electrically welded steel pipe	96,500 lb.	.25	.25	.20	"	"
57. Electrically welded steel pipe, installation only	93,081 lb.	.10	.09	.08	"	"
58. Cl. A conc. backfill around dam pipes	490 c. y.	20.00	22.50	25.00	"	"
59. Cl. B conc. backfill around dam pipes	210 c. y.	20.00	22.50	25.00	"	"
60. Furn. and install trash racks, roller paths, vent pipes, and stop log guides, and other struct. steel	270,000 lb.	.20	.22	.20	"	"
61. Furnish two self-closing Broome gates, for 6x8-ft. opening, and 350-ft. water head	Lump Sum	16,000.00	15,000.00	35,000.00	Bid separately in Aug. 6 openin	
62. Furn. complete set of frames, guides and rolled steel transition sections for Broome gates (El. 1340) and elect. driven traveling gate hoist	Lump Sum	44,000.00	40,000.00	45,000.00	Bid separately in Aug. 6 openin	
63. Add'l chain for gates at El. 1250 and El. 1265	Lump Sum	5,500.00	5,000.00	6,000.00	Bid separately in Aug. 6 openin	
64. Install Broome gates, hoisting cables, chain and hoists	150,000 lb.	.09	.09	.075	150,000 lb.	.08
65. 72-in. Butterfly valves (270-ft. head) complete	2 ea.	22,000.00	28,000.00	32,000.00	Bid separately in Aug. 6 openin	
66. 48-in. Butterfly valves (320-ft. head) complete	2 ea.	14,000.00	15,000.00	17,000.00	Bid separately in Aug. 6 openin	
67. Install Butterfly valves, appurtenances	130,000 lb.	.09	.05	.075	140,000 lb.	.08
68. Concrete in diversion tunnel plug	3,500 c. y.	15.00	14.00	25.00	Unchanged	Unchanged
69. Furn. and inst. lumber for Howe Truss, in place	25,000 f.bm.	.20	.22	.175	20,000 f.bm.	.20
70. Furn. and inst. lumber for roadway	15,000 f.bm.	.15	.18	.15	18,000 f.bm.	.15
71. Galv. grab irons and U-bolts	(Not specified in Jan. 21 opening)				500 lb.	.30
72. 1½-in. galv. iron railing, single rail	(Not specified in Jan. 21 opening)				700 l. f.	4.00
73. 2-in. galv. iron railing, double rail	(Not specified in Jan. 21 opening)				200 l. f.	8.00
74. State sales tax, 3 percent	....	208,104.54	233,552.39	291,606.00	....	179,015.94

* Where quantities and unit prices are marked "Unchanged," they remain as subsequently reported for the January 21, 1943 opening. Results shown und columns (1) in both August and January openings are from the same bidder.

AIRPORT PAVING, NEW JERSEY

OWNER: Civil Aeronautics Administration, First Region, LaGuardia Field, N. Y.

PROJECT: Concrete paving of runways, taxiways and apron for municipal airport in New Jersey. Includes necessary earth excavation, sand-gravel sub-base, and concrete and reinforcing steel for purposes other than paving. Pavement of plain concrete to be 6-in. section with thickened edges. It is to be constructed one or two lanes at a time. Cement content of concrete to be approximately 6.0 bags per cubic yards. Originally the bid schedules called for high early strength cement, but were subsequently changed to standard portland cement.

CONDITIONS: Contractor to furnish all materials, and depending upon which schedule the contract was awarded, to complete work in 90, 115 or 130 days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.50 to $2.12½ per hour; semi-skilled, 75c. to $1.75; and common, 75c. Operations are expected to continue into cold weather, with winter methods of construction made necessary.

BIDS: Five bids were opened October 24, 1942, on three schedules. On Schedule I, 296,200 square yards of concrete pavement were required; on Schedule II, 399,800 square yards; and on Schedule III (basis on which award was made), 424,300 square yards. Otherwise requirements were the same in all schedules. Bids on Schedule I ranged from $767,496 to $1,039,800; on Schedule II, from $1,018,792 to $1,402,400; and on Schedule III, from $1,076,779 to $1,488,150.

Schedule III

LIST OF BIDDERS:

1. Union Paving Co., Philadelphia, Pa. (contract)	$1,076,779
2. J. Leopold & Co., Inc., New York, N. Y	1,109,290
3. Thomas Gallo, Irvington, N. J	1,211,095
4. Francis A. Caruso & Son, Philadelphia, Pa	1,457,999
5. S. J. Groves & Sons, Inc., Ridgefield, N. J	1,488,150

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1. Earth excavation	500 c. y.	$1.50	$1.50	$1.00
2. Concrete pavement, plain	424,300 s. y.	2.53	2.60	2.85
3. Sand-Gravel sub-base	1,000 c. y.	1.90	5.00	1.00
4. Concrete, for miscellaneous structures	20 c. y.	30.00	15.00	15.00
5. Reinforcing Steel	500 lb.	.10	.12	.08

AIRPORT CONSTRUCTION NEW YORK

OWNER. U. S. Dept. of Commerce, Civil Aeronautics Administration, La Guardia Field, New York, N. Y.

PROJECT: Construction of an airport in Chautauqua County New York, consisting of clearing, grubbing, grading, draining paving and lighting facilities. Includes two runways 150 fee wide and 4,000 feet long, together with taxiways, etc.

CONDITIONS: Contractor to furnish all materials required for completion of clearing and paving schedules. On the lighting contract, the government is to furnish the beacon tower cabinets, rotating beacons, obstruction light fittings, 1- and 2 conductor parkway cables, wind cone assembly, splice boxes film cutouts, A. & J. boxes, strip lights, and range lights. Project has A-1-e priority rating. Railway and highway transportation facilities available near site of work. Wage rates are skilled labor, $1.00 to $1.75 per hour; semi-skilled, 65c. to $1.15; common, 75c.

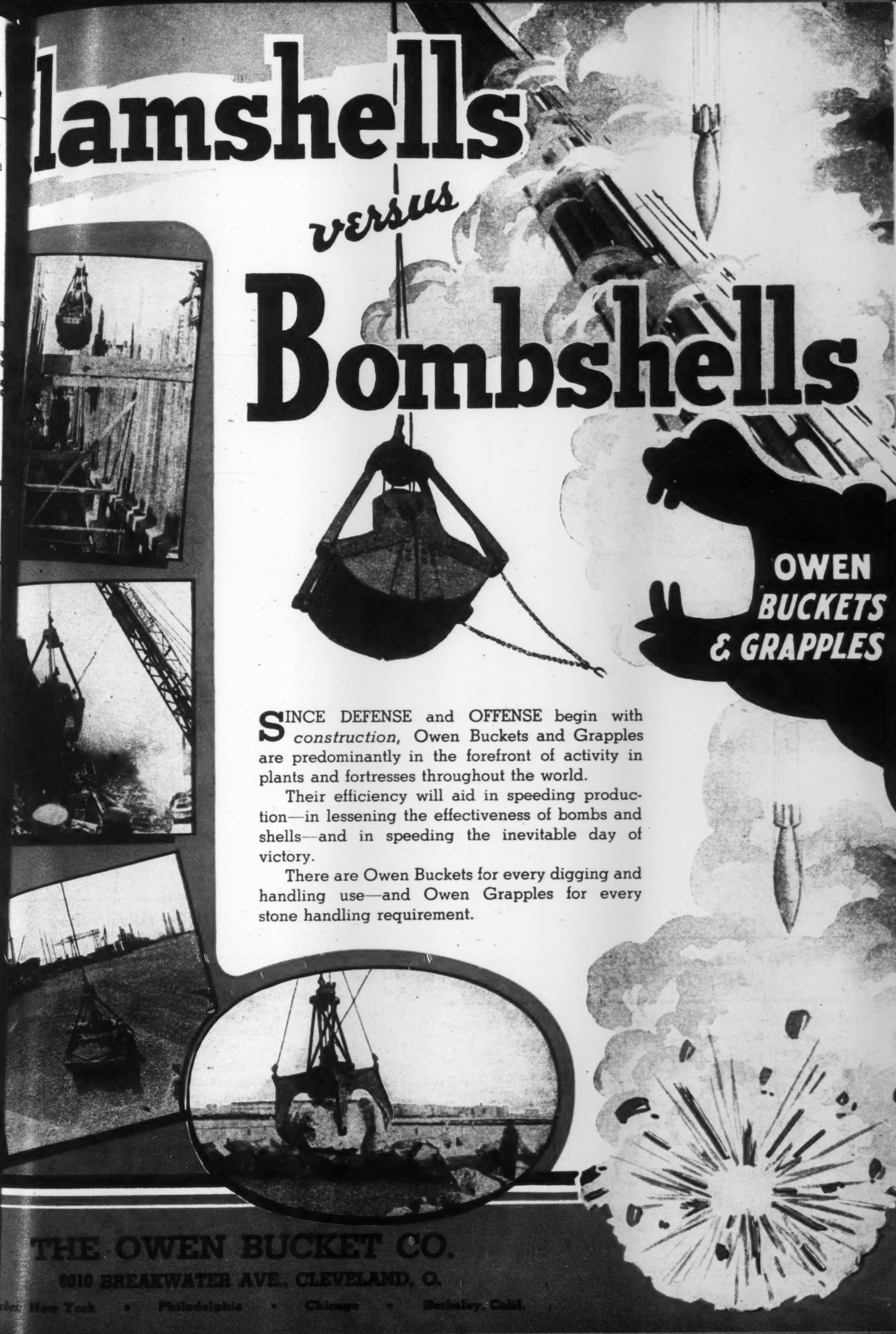
BIDS: Three bids were received on Schedule I (clearing, etc.) on July 22, 1942, ranging from the low of $245,587 to $273,252 On Schedule II (concrete paving) one bid was received, $357,375; and on Schedule II-A (bituminous paving), three bids were opened ranging from $192,300 to $254,620. Five bids were received on the lighting contract (Schedule III) ranging from the low of $17,516 to $23,369. This bid was on the basis of the transformer house (Item 28 in tabulation below) and elimination of transformer house and airport control panel.

Schedule I—Clearing, Drainage, etc.

LIST OF BIDDERS: (Engineer's estimate, $232,074.)

1. Depew Paving Co., Inc., Depew, N. Y., and John B. Schultz Contracting Co., Inc., Buffalo, N. Y. (contract)	$245,587
2. Tomack Subsidiary Co., Inc., Rochester, N. Y	254,220
3. C. B. Moon Co., Dunkirk, N. Y	273,252

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1. Clearing and grubbing	L. S.	$29,000.00	$20,000.00	$20,000.00
2. Excavation	286,000 c. y.	.55	.60	.60
3. 8-in. I. D. pipe, runway drainage	7,500 l. f.	1.10	1.30	2.00
4. 10-in. I. D. pipe, runway drainage	3,800 l. f.	1.25	1.40	2.15
5. 12-in. I. D. pipe, runway drainage	867 l. f.	2.40	2.50	2.60



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6. 15-in. I. D. pipe, runway drainage	3,177 l. f.	2.80	3.15	3.15
7. 10-in. I. D. pipe, field drains	800 l. f.	1.25	1.50	2.00
8. 12-in. I. D. pipe, field drains	2,350 l. f.	2.40	2.50	2.25
9. 15-in. I. D. pipe, field drains	960 l. f.	2.80	3.15	3.00
10. 10-in. I. D. pipe, culverts	600 l. f.	1.50	1.60	2.00
11. 12-in. I. D. pipe, culverts	105 l. f.	2.65	2.70	2.50
12. 15-in. I. D. pipe, culverts	700 l. f.	3.05	3.35	2.90
13. Porous backfill material	3,550 c. y.	2.70	1.65	3.00
14. Manhole, in place	35 ea.	75.00	105.00	200.00
15. Catchbasins, in place	11 ea.	60.00	75.00	125.00
16. Concrete	1 c. y.	25.00	20.00	25.00
17. Reinforcing steel	100 lb.	.12	.10	.10
18. Stone riprap	25 c. y.	25.00	10.00	10.00
19. Additional ditch excavation	50 c. y.	1.25	1.50	4.00
20. 42-in. I. D. pipe, culverts	50 l. f.	15.00	15.00	15.00
21. 18-in. I. D. pipe, culverts	25 l. f.	6.00	5.00	8.00
22. Drop inlets, in place	80 ea.	60.00	70.00	100.00
23. Fiber duct	4,500 l. f.	.75	1.00	1.00

Schedule II-A—Bituminous Paving (alternate)

LIST OF BIDDERS: (Engineer's estimate, $164,485.)

1. Depew Paving Co., Inc., Depew, N. Y., and John B. Schultz Con. Co., Inc., Buffalo, N. Y. (contract)	$192,300
2. Tomack Subsidiary Co., Inc., Rochester, N. Y	217,315
3. C. B. Moon Co., Dunkirk, N. Y	254,620

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Gravel base course	52,000 c. y.	$1.15	$1.45	$2.00
2. Bituminous prime coat	62,000 gal.	.14	.14	.14
3. Surface course	16,400 ton	7.00	7.70	8.00
4. Seal coat ,bituminous material	31,000 gal.	.14	.13	.12
5. Seal coat, aggregate	1,170 ton	4.00	2.50	6.00

Schedule III—Airport Lighting

LIST OF BIDDERS: (Engineer's estimate, $18,615.)

1. Schanche Constr. & Engr. Co., St. Louis, Mo. (low)	$17,516
2. Edward Zwicker Corp., New York, N. Y	20,530
3. Elco Installation Inc., New York, N. Y	21,257
4. John G. Hellman, Brooklyn, N. Y	21,936
5. Berry Electrical Co., Brooklyn, N. Y	23,369

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Transformer house (alternate)	L. S.	$5,200.00	$5,562.00	$4,640.00
2. Installing tower	L. S.	500.00	976.00	442.00
3. Excavating trench, 18-in. deep	23,000 l. f.	.10	.06	.13
4. Excavating trench, 36-in. deep	1,000 l. f.	.40	.40	.32
5. Install cable in trench	28,000 l. f.	.03	.05	.06
6. 2-in. galvanized conduit	50 l. f.	1.00	.85	.48
7. Install cable in duct	4,500 l. f.	.05	.14	.07
8. Contact lights, clear	15 ea.	94.00	106.00	88.00
9. Contact lights, yellow-clear	62 ea.	94.00	107.00	92.00
10. Range lights, yellow-green	14 ea.	94.00	107.00	93.00
11. Contact lights, clear	1 ea.	94.00	151.00	94.00
12. Contact lights, yellow-clear	2 ea.	94.00	152.00	94.00
13. Construction lights	4 ea.	25.00	23.00	51.00
14. Transformer, un-named KVA	1 ea.	90.00	116.00	136.00
15. Transformer, 0.25 KVA	1 ea.	90.00	125.00	136.00
16. Transformer, 0.50 KVA	1 ea.	90.00	132.00	136.00
17. Transformer, 1.00 KVA	1 ea.	90.00	152.00	136.00
18. 25-ft. pole	1 ea.	40.00	73.00	86.00
19. 35-ft. pole	1 ea.	50.00	76.00	96.00
20. 45-ft. pole	1 ea.	60.00	92.00	112.00
21. 55-ft. pole	1 ea.	75.00	104.00	145.00
22. 65-ft. pole	1 ea.	100.00	150.00	180.00
23. Installing wind cone	L. S.	100.00	145.00	240.00
24. Concrete	1 c. y.	20.00	11.00	14.00
25. Reinforcing steel	100 lb.	.10	.19	.12
26. Airport control panel (alt.)	L. S.	1,000.00	1,150.00	1,047.00
27. Install underground cable	300 l. f.	1.50	1.40	2.55
28. Transformer house (alt.)	L. S.	3,000.00	3,797.00	4,480.00

PAVING, CHEMUNG COUNTY AIRPORT, NEW YORK

OWNER: Civil Aeronautics Administration, First Region, LaGuardia Field, New York, N. Y.

PROJECT: Paving of runways on the Chemung County Airport, near Elmira, N. Y. The three runways are each approximately 4,000 ft. long and 150 ft. wide. Alternates were allowed on the 243,000 sq. yd. of paving: Schedule I—asphalt emulsion; Schedule II—RT-6 or RT-7 (tar); and Schedule III—soil cement base course. Award made on basis of latter. Unit prices on previous contracts for the Chemung County Airport were published on page 18, March 5, 1941 issue of *ENR*.

CONDITIONS: Contractor to furnish all materials, equipment and labor, and complete work in 100 calendar days. Rail and highway transportation facilities available. Wage rates specified are: skilled labor, $1.00 to $1.50; semi-skilled, 62½c. to 90c.; and common labor, 62½c. per hr. Preferen rating on project is A-4.

BIDS: Five bids were received March 11, 1942, on Schedule I three bids on Schedule II; and five bids on Schedule III Engineer's estimates were: (I) $286,565; (II) $288,925 (III) $287,814.

Schedule I

LIST OF BIDDERS: No award made on this basis.

1. James Gibbons Co., Relay, Md.	$315,55
2. Binghamton Constr. Co., Inc., Binghamton, N. Y.	343,91
3. Grandview Co., Mount Vernon, N. Y.	347,79
4. Del Balso & Sprague, Inc., New York, N. Y.	385,47
5. Fitzgerald Bros. Constr. Co., Troy, N. Y.	432,17

		Unit Prices		
Item	Quan.	(1)	(2)	(3
1. Base course	243,000 s. y.	$0.19	$0.37	$0
2. Asphalt emulsion	5,780 ton	22.50	22.00	23
3. Blending aggregate	2,000 c. y.	2.55	2.00	2
4. Tack coat, RC-3 asphalt	195 ton	23.30	29.00	28
5. Bituminous mixture	18,300 ton	5.25	4.75	5
6. Asphalt cement, or RC-5	915 ton	18.50	19.00	19
7. RC-2 Asphalt	255 ton	23.30	26.00	26
8. Course aggregate	2,500 ton	4.30	2.50	2

Schedule II

LIST OF BIDDERS: No award made on this basis.

1. Grandview Co., Mount Vernon, N. Y.	$336,35
2. Binghamton Constr. Co., Inc., Binghamton, N. Y.	338,25
3. Fitzgerald Bros. Constr. Co., Inc., Troy, N. Y.	417,05

		Unit Prices		
Item	Quan.	(1)	(2)	(3
1. Base course	243,000 s. y.	$0.34	$0.37	$0.
2. RT-6 or RT-7	4,860 ton	25.00	25.00	29
3. Blending aggregate	2,000 c. y.	2.40	2.00	1.
4. Tack coat, RC-3 asphalt	195 ton	26.00	29.00	30.
5. Bituminous mixture	18,300 ton	5.00	4.75	5.
6. Asphalt cement, or RC-5	915 ton	19.65	19.00	20
7. RC-2 Asphalt	255 ton	26.00	26.00	30
8. Course aggregate	2,500 ton	2.50	2.50	3

Schedule III

LIST OF BIDDERS: Award made on this basis.

1. Grandview Co., Mount Vernon, N. Y. (contract)	$303,134
2. D. W. Winkelman Co., Syracuse, N. Y.	306,859
3. Binghamton Constr. Co., Inc., Binghamton, N. Y.	341,783
4. Del Balso & Sprague, Inc., New York, N. Y.	347,427
5. Fitzgerald Bros. Constr. Co., Inc., Troy, N. Y.	371,005

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Excavating and grading	2,000 c. y.	$1.00	$1.00	$1.0
2. Soil cement base course	243,000 s. y.	.35	.44	.5
3. Cement	32,800 bbl.	2.65	2.60	2.7
4. Tack coat, emulsified asphalt	48,600 gal.	.14	.11	.1
5. Bituminous mixture	18,300 ton	5.00	4.30	5.0
6. RC-5 or asphalt cement	915 ton	19.65	18.85	19.0
7. RC-2 cutback asphalt	255 ton	26.00	25.00	26.0
8. Course aggregate	2,500 ton	2.50	2.00	2.5

AIRPORT PAVING, DRAINAGE AND GRADING, PENNSYLVANIA

OWNER: U. S. Engineer Office in conjunction with Civil Aeronautics Administration, Philadelphia, Pa.

PROJECT: Construction of landing strips, runways, taxiways, apron area and graded areas inclosed by and adjacent to above items at airport in Pennsylvania. Main features are removal of structures, clearing and grubbing, grading, and top-soiling in the grading contract; and field drainage, underground electrical duct, preparation of subgrade, 6-in. gravel sub-base course, 4-in. dry-bound macadam base course, bituminous prime coat, 2-in. asphaltic concrete surface course, and seal coat in the paving and drainage contract.

CONDITIONS: Contractor to furnish all materials and complete the grading portion of the contract in 70 days, and the paving and drainage portion in 100 days. Rail, highway and water transportation facilities available near site of work. Wage rates are: skilled labor $1.25 to $1.82½ per hr.; semi-skilled, 80c. to $1.00; and unskilled, 77½c.

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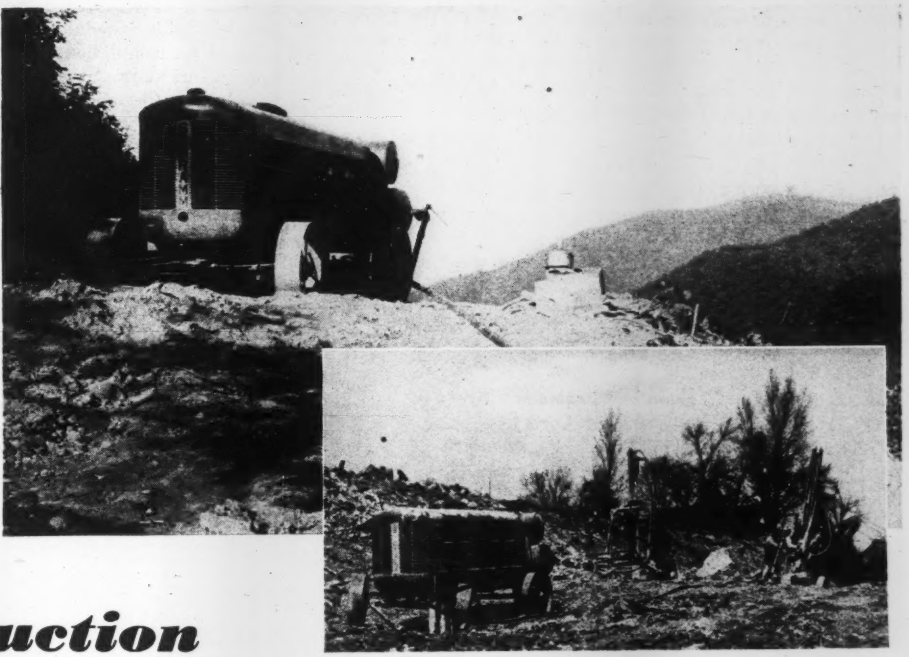

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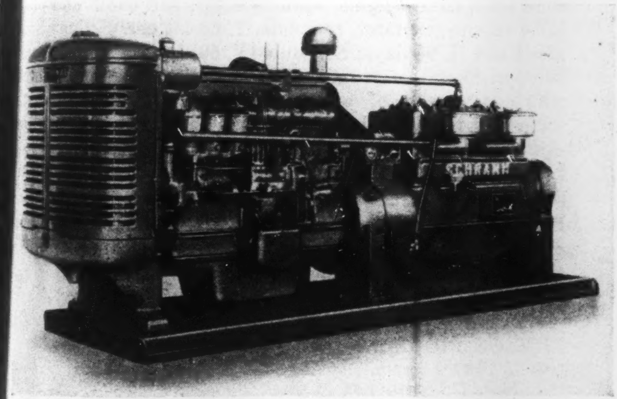

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BIDS: Two bids were received April 6, 1942 on the grading work, the contract low of $461,144 and $499,409. Four bids were opened April 28, 1942 on the paving and drainage work, ranging from the contract low of $449,341 to $534,831. Engineer's estimates were: $308,611 for grading, and 478,056 for paving and drainage.

Grading

LIST OF BIDDERS: Bids opened April 6, 1942.

1. James D. Morrissey, Philadelphia, Pa. (contract)	$461,144.00
2. C. T. Burket, Vineland, N. J.	499,409.00

Item	Quan.	Unit Prices (1)	(2)	(3)*
1. Removal of structures	L. S.	$1,000.00	$10,000.00	$2,000.00
2. Clearing and grubbing	L. S.	19,920.00	8,000.00	5,000.00
3.†Unclassified excavation	1,175,700 c. y.	.32	.37	.23
4. Topsoil	160 ac.	400.00	290.00	195.00

Engineer's estimate

Paving and Drainage

LIST OF BIDDERS: Bids opened April 28, 1942.

1. John Meehan & Son, Philadelphia, Pa. (contract)	$449,340.50
2. Union Paving Co., Philadelphia, Pa.	458,888.00
3. Union Bldg. & Constr. Corp., Passaic, N. J.	498,168.50
4. Del Balso & Sprague, Inc., New York, N. Y.	534,830.75

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 6-in. gravel sub-base course	39,100 c. y.	$2.00	$2.00	$2.10
2. 4-in. dry-bound macadam base crse	31,050 c. y.	4.00	3.95	4.50
3. Bituminous prime coat	65,900 gal.	.15	.12	.10
4. 2-in. asphaltic conc. surf. crse	175,300 s. y.	.70	.77	.82
5. Rapid curing cut-back asph. (seal)	44,000 gal.	.17	.10	.10
6. Cover aggregate for seal coat	1,250 ton	3.00	2.00	2.25
7. 8-in. vit. clay or conc. sew. pipe, sealed joints	1,100 l. f.	.56	.62	.80
8. 12-in. vit. clay or conc. sew. pipe, sealed joints	9,600 l. f.	.79	.75	.90
9. 15-in. vit. clay or conc. sew. pipe, sealed joints	1,250 l. f.	1.24	1.18	1.25
10. 18-in. vit. clay or conc. sew. pipe, sealed joints	1,350 l. f.	1.78	1.60	1.75
11. 21-in. vit. clay or conc. sew. pipe, sealed joints	700 l. f.	2.30	2.10	2.10
12. 24-in. r. c. sew. pipe, sealed and half-sealed jts	850 l. f.	2.92	2.60	2.75
13. 30-in. r. c. sew. pipe, sealed and half-sealed jts	25 l. f.	3.90	3.50	4.50
14. 36-in. r. c. sew. pipe, sealed and half-sealed jts	250 l. f.	5.20	5.00	6.50
15. 12-in. rein. conc. culv. pipe, sealed joints	1,550 l. f.	1.30	1.15	1.40
16. 15-in. rein. conc. culv. pipe, sealed joints	350 l. f.	1.58	1.55	1.75
17. 18-in. rein. conc. culv. pipe, sealed joints	400 l. f.	2.22	1.90	2.75
18. 24-in. rein. conc. culv. pipe, sealed joints	800 l. f.	3.04	2.75	3.25
19. 30-in. rein. conc. culv. pipe, sealed joints	200 l. f.	4.38	3.90	4.25
20. 12-in. porous. conc. pipe, sealed joints	1,850 l. f.	1.36	1.20	1.45
21. 15-in. porous. conc. pipe, sealed joints	150 l. f.	2.02	1.80	1.90
22. 18-in. porous. conc. pipe, sealed joints	200 l. f.	2.65	2.25	2.50
23. 21-in. porous. conc. pipe, sealed joints	850 l. f.	3.63	3.25	3.25
24. Excavation for drainage trenches	9,700 c. y.	1.50	1.65	1.75
25. Rock excav. for drainage trenches	2,000 c. y.	4.00	5.00	7.50
26. Sand backfill and grav. filter, drain. trenches	8,100 c. y.	3.10	3.65	2.50
27. Excavation, open drainage ditches	25 c. y.	2.00	2.20	1.00
28. Concrete inlets	92 ea.	31.00	55.00	65.00
29. Manholes, 6-ft. or less in depth	93 ea.	60.00	71.00	75.00
30. Extra depth manholes	131 l. f.	10.00	16.50	15.00
31. Castings	59,000 lb.	.09	.10	.10
32. 3-in. electrical duct	5,750 l. f.	.35	.80	.55

AIRPORT PAVING AND GRADING KANSAS CITY, MO.

OWNER: Civil Aeronautics Administration, Fifth Regional Office, Kansas City, Mo.

PROJECT: Grading, drainage, paving and miscellaneous items in connection with the construction of the Kansas City Auxiliary Airport located south of Kansas City, Mo., and on property owned by the city. Includes necessary earth and rock excavation, watering, furnishing and laying drainage pipe, concrete manholes, brick manholes, reinforcing steel, rough stone masonry, and riprap in Schedule I. Schedule II requires 327,350 square yards of plain 9-7-9-in. concrete pavement, necessary underground ducts, and concrete gutter 9-in. thick.

CONDITIONS: Contractor to furnish all materials and complete Schedule I in 200 days, and Schedule II in 150 days. Rail and highway transportation facilities available at project site. City to extend water supply, and to provide source of electrical energy at the site. Priority rating is AA-4. Minimum wage rates specified are: skilled labor, $1.00 to $1.65 per hour; semi-skilled, 90c. to $1.37½; and common, 90c.

BIDS: Six bids were received on the combination of Schedules I and II November 30, 1942, ranging from the contract low of $1,471,336 to $2,493,310. Schedules III and IV, which identical with Schedules I and II except for the shorter allowed for completion, had two bidders. They were: We Contracting Corp., Sioux City, Iowa, $1,684,456; and the Kiewit Sons Co., and Condon-Cunningham Co., Omaha, N $1,910,742.

LIST OF BIDDERS: (Schedules I and II combined.)

1. Koss Constr. Co., Des Moines, Iowa (contract)	$1,47
2. Western Contracting Corp., Sioux City, Iowa	1,63
3. Harrison Engr. & Constr. Corp., Kansas City, Mo	1,68
4. Stephen-Brown Co., & Perry McGlone Constr. Co., Kansas City, Mo	1,77
5. Peter Kiewit Sons Co., & Condon-Cunningham Co., Omaha, Nebr.	1,82
6. Lancaster Corporation, Omaha, Nebr	2,49

Item	Quan.	Unit Prices (1)	(2)
1. Common excavation	640,000 c. y.	$0.42	$0.35
2. Solid rock excavation	200,000 c. y.	1.30	1.20
3. Water, in place	5,000 M gal.	Free	1.00
4. 6-in. drainage pipe	4,480 l. f.	1.40	2.25
5. 8-in. drainage pipe	10,280 l. f.	1.75	2.50
6. 10-in. drainage pipe	7,310 l. f.	2.10	2.80
7. 12-in. drainage pipe	5,870 l. f.	2.45	3.00
8. 15-in. drainage pipe	4,600 l. f.	3.20	3.70
9. 18-in. drainage pipe	2,350 l. f.	4.20	5.10
10. 21-in. drainage pipe	1,060 l. f.	5.00	6.70
11. 24-in. drainage pipe	280 l. f.	6.00	8.00
12. 27-in. drainage pipe	370 l. f.	7.00	9.00
13. 30-in. drainage pipe	270 l. f.	8.00	10.00
14. Rock excavation for drainage struct.	3,000 c. y.	10.00	8.50
15. Earth excavation, for ditches	2,000 c. y.	1.50	1.00
16. Concrete manholes	149 ea.	170.00	130.00
17. Extension manholes, below 6-ft	40 ft.	25.00	30.00
18. Brick manhole, iron grating	14 ea.	170.00	140.00
19. Extension brick manholes	20 ft.	25.00	30.00
20. Concrete for headwalls	10 c. y.	50.00	50.00
21. Reinforcing steel	1,000 lb.	.07	.07
22. Rough stone masonry	10 c. y.	40.00	25.00
23. Riprap, as ordered	5,000 s. y.	2.50	4.00
24. Underground duct	6,300 l. f.	1.00	2.50
25. Underground duct, additional run	2,100 l. f.	.50	1.00
26. 9–7–9 in. concrete pavement	327,350 s. y.	2.13	2.72
27. Additional for heat and protection	80,000 s. y.	.25	.20
28. Concrete gutter, 9-in. thick	16,230 s. y.	3.20	3.45

AIRPORT, TEXAS

OWNER: Civil Aeronautics Administration, Fort Worth, T

PROJECT: Grading, draining, paving, fencing, conditioni seeding, lighting and installation of water well and towers airport in Terrell County, Tex.

CONDITIONS: Contractor to furnish all materials exc boundary light cones, 51-ft. tower, "G" and "T" cabine three-conductor No. 8 parkway cable, lightning arrest ground rods, Type A-J junction boxes, switches, boundary li globes and fittings, 36-in. rotating beacon, wind cone assembl wind sock, hazard lights, warning signs, and one 5 and one KVA engine-generator, complete. Time for completion: Sche ules I and II, 90 days; Schedule IV, 60 days; and Schedule 30 days. Shortage of water in area may necessitate beginni with construction of water well (Schedule V) first so th water will be available for grading. Wage rates specified ar skilled labor, $1.00 to $1.50 per hour; semi-skilled, 40c. $1.00; and common labor, 40 to 50c. Project has priori rating of AA-4.

BIDS: Bids were received October 26, 1942, on all schedul except Schedule III. List of bidders on each schedule a shown below with the amount of each bid.

Schedule I

LIST OF BIDDERS: (Engineer's estimate, $77,152)

1. C. Hunter Strain, San Angelo, Tex. (low bidder)	$66,21
2. Bleeker Constr. Co., Mineral Wells, Tex	100,32
3. Cage Brothers, Uvalde, Tex	108,86
4. Holland Page, Austin, Tex	151,64

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Fence, Class D	1,260 rd.	$1.50	$4.00	
2. Grading	57,000 c. y.	.37	.48	
3. Excavation, unclassified	100 c. y.	1.00	2.00	

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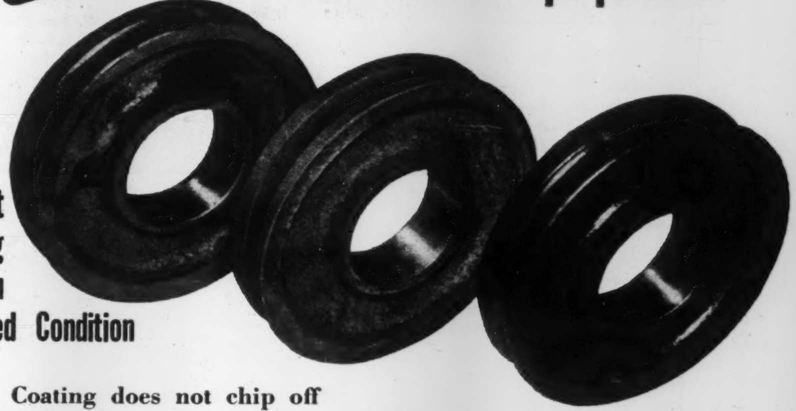

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special process for treating placement parts for LeTourneau equipment has been inalled to prevent rusting and orroding during months of exosure to salt air and arctic and opical conditions encountered shipments and storage of war pplies. This same protection now given parts for all LeTourneau equipment, both domestic d export shipments . . . at no xtra cost to you.

ll machined parts first are oroughly cleaned to remove all irt and grease; then dipped in special solution which gives uniform, plastic-like coating the entire surface of the parts. n tests this protective coating as resisted corrosion for 300 ours of exposure in salt spray. t is not sticky or greasy . . . hus, parts are easy to store and andle, do not collect dust and dirt. Coating does not chip off or rub off.

Saves You Time and Money

You save time and money when you get machined parts in good condition, free from rust, corrosion and grease . . . they are easier fitting, take less time and labor to fit . . . last longer because they're not damaged by corrosion . . . assure better equipment operation. The protective coating readily dissolves in oil and grease and has no harmful effect on the lubricating oil or grease used in LeTourneau equipment. If you prefer, the coating may be easily removed with fuel oil, gasoline, kerosene or lubricating oil before using the part.

Take advantage of this extra service . . . get rust-resistant parts for your LeTourneau equipment. Your LeTourneau-"Caterpillar" dealer's Victory Service Base is nearby . . . see him, now, for expert parts and repair service.

Machined sheave (above, left) is thoroughly washed . . . comes out free of grease and dirt (above, center) . . . is then dipped in special solution and dried giving a uniform, plastic-like coating (above, right) which prevents rusting and corrosion. Coated parts are placed in carton for protection against physical damage. On export shipments machined surfaces are further protected with water-tight, air-tight paper wrapping sealed with coat of wax.

Bearings of this type are adequately treated by the manufacturer to resist corrosion under normal domestic conditions. These photos illustrate how extra protection is given parts for export shipment by LeTourneau. Bearing is greased, wrapped in special grease-proof paper, wrapped again with heavy self-sealing wax paper and dipped in wax, thus making a water-tight, air-tight covering. Sealed bearing is then placed in carton ready for boxing.

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4. Conditioning, surface	120 ac.	22.00	180.00	30.00
5. Clearing and grubbing	125 ac.	18.00	20.00	80.00
6. 8-in. pipe, closed	830 l. f.	.95	1.00	1.30
7. 8-in. pipe, open jointed	18,014 l. f.	.80	1.20	1.15
8. Aggregate, trench backfill	4,600 ton	2.50	3.00	3.60
9. Plain concrete headwall	3 ea.	85.00	70.00	160.00
10. Seeding	210 ac.	22.00	10.00	30.00
11. Gate, fence	1 ea.	25.00	50.00	175.00
12. Open ditch excavation	3,100 c. y.	.75	.50	.80
13. Rock riprap	10 c. y.	15.00	12.00	[12.00
14. 3-in. fiber duct	1,000 l. f.	.65	....	2.40
15. Concrete (1:2:4 mix)	10 c. y.	40.00	40.00	24.00
16. Reinforcing steel	200 lb.	.08	.25	.12
17. Rock excavation	300 c. y.	2.00	3.00	3.00
18. Rock riprap, in place	200 c. y.	12.50	10.00	9.00

Schedule II

LIST OF BIDDERS: (Engineer's estimate, $90,350)

1. C. Hunter Strain, San Angelo, Tex. (low bidder)	$105,690
2. Holland Page, Austin, Tex	108,880
3. Cage Brothers, Uvalde, Tex	180,240

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Aggregate, base course	50,000 c. y.	$1.69	$2.25	$1.10
2. Asphalt	55,000 gal.	.12	.14	.12
3. Asphalt aggregate, 2-in. fluxed asph	16,000 ton	6.00	6.00	6.70
4. Seal coat, fine; 2-in. fluxed asph	1,400 ton	3.75	5.50	5.00
5. Seal coat, asph.; 2-in. fluxed asph	37,000 gal.	.12	.14	.12

Schedule IV

LIST OF BIDDERS: (Engineer's estimate, $5,906)

1. Aaron U. Connor, Wink, Tex. (low bidder)	$4,987
2. M. E. Souther, Inc., St. Paul, Minn	5,214
3. Nelson Electric Co., El Paso, Tex	7,356
4. Service Electric Co., Bismarck, N. D	9,700
5. Empire Electric Co., Fort Worth, Tex	13,453
6. Holland Page, Austin, Tex	14,805

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Furnish labor and mat'l (except for Govt. furnished mat'l.) for two 5 KVA engine generators, one automatic control switch, one G-3 cabinet, etc., complete with fittings	Lump Sum	$500.00	$250.00	$340.00
2. Install parkway cable	Lump Sum	....	....	....
3. Erect tower and beacon	Lump Sum	485.00	350.00	685.00
4. Install boundary lights	74 ea.	15.00	11.00	24.85
5. Install multiple cable	20,500 l. f.	.10	.15	.12
6. Install cable in trench	20,500 l. f.	.04	.03	.065
7. Concrete mix	10 c. y.	2.00	1.00	20.00
8. Rock excavation	100 c. y.	.20	1.00	5.00

Schedule V

LIST OF BIDDERS: (Engineer's estimate, $18,100)

1. Cage Brothers, Uvalde, Tex. (low bidder)	$9,725
2. C. Hunter Strain, San Angelo, Tex	16,068
3. Holland Page, Austin, Tex	22,105

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Drill water well from 0 to 1,000-ft. depth	1,000 ft.	$2.25	$4.00	$4.55
2. Furn. and install 8-in. casing, 0 to 1,000 ft.	1,000 ft.	.85	2.25	2.30
3. Drill well, 1,000 to 1,500 ft.	500 ft.	2.50	5.00	5.55
4. Casing from 1,000 to 1,500 ft.	500 ft.	.95	2.50	3.00
5. Install water well pump	Lump Sum	2,500.00	4,750.00	5,980.00
6. Install power shed, complete with generator, etc.	Lump Sum	1,000.00	835.00	3,000.00
7. Install wood tower and tank	Lump Sum	1,400.00	483.00	2,000.00
8. (Alternate for Item 7). Job price for furnishing labor and mat'l., (other than Govt. furnished steel) for tower and wood tank, complete	Lump Sum	2,800.00	225.00	1 500.00

STREET PAVING, CHICAGO

OWNER: City of Chicago, Department of Streets & Electricity.

PROJECT: Concrete paving 3,714 feet of 103rd. St., from S. Michigan Ave. to S. Cottage Grove Ave., in Chicago, Ill. Contract includes removal of one track of street car line, trolley poles and overhead wire.

CONDITIONS: Contractor to furnish all materials and complete work by December 1, 1942. Highway and water transportation facilities available. Wage rates are: skilled labor, \$1.62½ to \$2.00 per hr.; semi-skilled, \$1.10 to \$1.70; and common labor, \$1.02½.

BIDS: Twelve bids were opened April 10, 1942, rang from the low of \$73,897 to \$82,106.

LIST OF BIDDERS:

1. Ready Coal and Constr. Co., Chicago, Ill. (low)	$73,
2. Chatham Paving Co., Chicago, Ill.	75,
3. Standard Paving Co., Chicago, Ill.	75,
4. James P. O'Keefe Co., Chicago, Ill.	75,
5. States Improvement Co., Chicago, Ill.	75,
6. Contracting & Material Co., Evanston, Ill.	76,
7. H. G. Goelitz Co., Cicero, Ill.	76,
8. Sensibar Engr. & Paving Co., Chicago, Ill.	76,
9. Leininger Constr. Co., Chicago, Ill.	77,
10. John A. McGarry & Co., Chicago, Ill.	78,
11. James A. Sackley Co., Chicago, Ill.	78,
12. J. A. Ross & Co., Chicago, Ill.	82,

Item	Quan.	Unit Prices (1)	(2)
1. Special excavation	7,150 c. y.	$0.65	$0.85
2. Trench backfill	500 c. y.	1.20	.75
3. 8-in. vit. tile pipe storm sew., type 2	720 l. f.	1.50	1.00
4. 8-in. vit. tile pipe storm sew., built in tunnel	80 l. f.	2.00	2.75
5. 10-in. vit. tile pipe storm sewers	130 l. f.	1.50	1.65
6. 8-in. cast iron pipe storm sewer	30 l. f.	3.50	3.00
7. New manholes — 36-in., type 5, frame and lid	2 ea.	70.00	75.00
8. Manholes to be adjusted	19 ea.	7.00	8.00
9. Manholes to be reconstructed	18 ea.	20.00	17.00
10. New catchbasins, type A, 48-in., with T-5 frame and lid	30 ea.	75.00	77.00
11. Catchbasins, type A, 48-in. with exist. frame and lid	6 ea.	60.00	70.00
12. Catchbasins to be adjusted	5 ea.	7.00	8.00
13. Catchbasins to be reconstructed	5 ea.	20.00	17.00
14. Abandoned catchbasins and manholes cleaned, blocked and filled	60 ea.	5.00	5.00
15. Special inlets	4 ea.	30.00	35.00
16. Cast iron, type 5, frame and lid	47 ea.	25.00	22.00
17. Comb. conc. curb and gutter, type 3	7,100 l. f.	.71	.65
18. Special concrete curb	40 l. f.	.71	.80
19. Special concrete gutter	150 l. f.	.56	.70
20. Special conc. curb and gutter	230 l. f.	1.21	1.25
21. Portland cement conc. sidewalk	11,500 s. f.	.20	.20
22. Portland cement conc. step sidewalk	250 l. f.	.35	2.50
23. Portland cement conc. driveway	100 s. y.	2.00	1.90
24. 1-in. premoulded expan. joint	1,100 s. f.	.14	.18
25. Portland cement concrete pavement	18,400 s. y.	1.82	1.82
26. Granite block pavement	20 s. y.	7.00	7.50
27. Portland cement	9,250 bbl.	2.15	2.15
28. Black traffic marker	5,600 s. f.	.08	.08

PAVING AND WIDENING STREET PENNSYLVANIA

OWNER: Allegheny County Commissioners, Pittsburgh, Pa. R. G. Woodside, controller; Levi Burd Duff, engineer.

PROJECT: Reinforced-concrete paving, curbing, widening and relocation of car tracks on Swissvale Avenue, from South to Edgewood Boro line, Wilkinsburg, Pa. Includes all necessary excavation, concreting, relaying of portion of brick pavement, drainage structures, demolition of buildings, and salvaging of some materials in existing pavement.

CONDITIONS: Rail and highway transportation facilities available. Contractor to furnish all materials and complete work in 90 days. Approximately five-sixths of the cost will be borne by the county, and the balance by the Pittsburgh Railways Co.

BIDS: Five bids were received March 24, 1942, ranging from the contract low of \$85,915 to \$99,635. Contract awarded April 7, 1942.

LIST OF BIDDERS:

1. Dinardo, Inc., Pittsburgh, Pa. (contract)	$85,915
2. Ben Construction Co., Pittsburgh, Pa.	87,608
3. McCrady Construction Co., Pittsburgh, Pa.	95,132
4. Nardulli & Sons, Inc., Pittsburgh, Pa.	97,664
5. M. O'Herron Co., Pittsburgh, Pa.	99,635

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation, Class I	5,100 c. y.	$1.10	$0.90	$1.35
2. Excavation, Class II (if ordered)	25 c. y.	3.00	2.00	3.60
3. Remove and dispose of undisclosed artificial underground structures	5 c. y.	7.00	2.00	3.00
4. Concrete, Class A-M, sidewalk on grade	13,000 s. f.	.40	35	.30
5. Concrete, Class A, base crse., 8-in	290 s. y.	3.25	2.50	4.45
6. Concrete, Cl. A, base crse., 8-in. thick, incl. steel reinf. in street railway area	1,485 s. y.	3.10	3.00	3.50
7. Conc., Cl. A, base crse., 6-in., st. ry. area	730 s. y.	3.00	2.50	2.55

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8. Conc., Cl. P, special one-course pavmt., 9-in. thick	7,800 s. y.	3.75	3.80	4.10
9. Conc., Cl. P, surf. crse., 4-in. thick, st. ry. area	2,130 s. y.	3.00	2.60	2.20
10. Class A-M conc. curb, with underdrain	1,850 l. f.	2.10	2.50	2.50
11. Class A-M conc. curb with underdr. and 6-in. perf. clay pipe	1,870 l. f.	2.30	3.00	2.85
12. Cement—substitution in HES. conc.	16,800 sacks	.25	.20	.18
13. Brick pavement, relaid	405 s. y.	2.50	2.00	1.85
14. 12-in. rein. conc. pipe culvert	320 l. f.	3.00	3.50	4.40
15. 15-in. rein. conc. pipe culvert	960 l. f.	3.25	4.00	5.10
16. 18-in. rein. conc. pipe culvert	240 l. f.	3.50	4.50	6.00
17. Brick storm inlets, type 1 and 1-a	24 ea.	135.00	150.00	225.00
18. Brick storm inlets, type 6	3 ea.	135.00	150.00	230.00
19. Brick manholes	5 ea.	150.00	120.00	200.00
20. Raising catch basin, storm inlet or manhole castings	15 ea.	10.00	10.00	20.00
21. Lowering catch basin, storm inlet or manhole castings	2 ea.	10.00	20.00	15.00
22. Underdrain with 6-in. perf. clay pipe	300 l. f.	1.25	1.00	1.45
23. Steel reinforcement bars	6,000 lb.	.10	.10	.06
24. Sheeting, shoring and bracing, left in place	5 Mbm.	30.00	30.00	30.00
25. Demolition, Bldg. 1, if ordered	L. S.	100.00	125.00	125.00
26. Demolition, portion Bldg. 2, if ordered	L. S.	300.00	330.00	300.00
27. Demolition, portion Bldg. 3, if ordered	L. S.	250.00	300.00	250.00
28. Demolition, Bldg. 4, if ordered	L. S.	100.00	125.00	125.00
29. Demolition, Bldg. 5, if ordered	L. S.	100.00	125.00	125.00
30. Demolition, Bldg. 6	L. S.	100.00	125.00	125.00
31. Demolition, portion Bldg. 7	L. S.	250.00	300.00	210.00
32. Demolition, portion Bldg. 8	L. S.	250.00	300.00	100.00
33. Deliver brick removed from exist. pvmt. to main warehouse, Blawnox	120 M.	3.00	8.00	9.00
34. Deliver sound curb stone removed from Swissvale Ave. to warehouse	3,000 l. f.	.50	.50	.50
35. Deliver sound flagstone removed from Swissvale Ave. to warehouse	800 l. f.	.50	.50	.60
36. Deliver broken curb, flagstone and stone removed from wall to warehouse	100 ton	4.00	3.00	4.50
37. Contractors' tools, plant, equipment and overhead	L. S.	2,500.00	3,500.00	2,600.00
38. Maintenance of traffic	L. S.	1,000.00	1,500.00	750.00

INDUSTRIAL EXPRESSWAY, DETROIT, MICHIGAN

OWNER: Michigan State Highway Department, Lansing.

PROJECT: Improve 2.271 miles of Detroit Industrial Expressway from Inkster Road to West Jim Daly Road, Wayne County, Mich. Involves construction of two 24-ft. lanes of concrete pavement, 9-in. uniform in thickness. Center section must be graded as well as the roadway itself. Excavation is practically all from borrow pits.

CONDITIONS: Contractor to furnish all materials and complete work by January 1, 1943. Rail and highway transportation facilities available near site of work. Wage rates stipulated are: skilled labor, \$1.50 to \$1.62½ per hr.; semi-skilled, \$1.00; and common, 90c.

BIDS: Two bids were opened June 24, 1942, the low of \$549,933, and \$565,773.

LIST OF BIDDERS:

1. Louis Garavaglia & Son, Detroit, Mich. (low bidder)	\$549,933
2. Julius Porath & Son Co., Detroit, Mich.	565,773

Item	Quan.	Unit Prices (1)	Unit Prices (2)
1. Clearing	7 ac.	\$100.00	\$100.00
2. Clearing	1 sta.	25.00	25.00
3. Grubbing	130 s. rd.	1.25	1.00
4. Remove trees 8 to 12-in. dia	4 ea.	10.00	15.00
5. Remove sidewalk	138 s. y.	.30	.25
6. Earth excavation	135,438 c. y.	.45	.35
7. Overhaul	384,729 c. y. sta.	.015	.01
8. Overhaul	67,250 c. y. mi.	.12	.12
9. Trim and finish earth grade	123 sta.	10.00	15.00
10. Grade A concrete	23 c. y.	25.00	25.00
11. 18-in. Class B culverts	256 l. f.	2.50	3.00
12. 24-in. Class B culverts	140 l. f.	4.00	5.00
13. 36-in. Class B culverts	124 l. f.	7.00	7.00
14. 48-in. Class B culverts	148 l. f.	12.00	12.00
15. 6-in. sewer with open joints	8,280 l. f.	60	.80
16. 12-in. sewer	1,764 l. f.	1.45	1.50
17. 12-in. sewer with open joints	820 l. f.	1.40	1.25
18. Manholes, 1-A	6 ea.	100.00	100.00
19. Catch basins, 3-C	13 ea.	100.00	90.00
20. Catch basins, 6-C	8 ea.	100.00	80.00
21. Inlet, 5-C	14 ea.	90.00	80.00
22. Stone masonry	35 c. y.	10.00	15.00
23. Fine grading and clean-up	123 sta.	10.00	15.00
24. Concrete pavement, 9-in. uniform	38,081 s. y.	2.70	2.75
25. Emulsified carbon black	4,527 s. y. pavmt.	.50	.50
26. Concrete curb (det. 5-A)	12,219 l. f.	1.30	1.50
27. Topsoil surface	6,740 c. y.	.45	.50
28. Stabiized earth shouders, 6-in. mix	247 sta.	5.00	10.00
29. Shoulder borrow	2,931 c. y.	.40	.50
30. Water for wetting	8 M gal.	10.00	15.00
31. Guard posts	70 ea.	1.50	1.50
32. Sodding	6,450 s. y.	24	.25
33. Conc. right-of-way markers	25 ea.	4.50	5.00
34. Obliterating abandoned road	1 ac.	75.00	100.00
35. Clearing	1 ac.	100.00	100.00
36. Clearing	1 sta.	25.00	
37. Grubbing	229 s. rd.	1.25	
38. Remove trees, 8 to 12-in. dia	31 ea.	10.00	
39. Remove trees, 13 to 24-in. dia	14 ea.	20.00	
40. Remove trees, 25 to 36-in. dia	3 ea.	30.00	
41. Remove trees 37-in. and over in dia	1 ea.	50.00	
42. Remove old culvert	1 ea.	250.00	
43. Remove old pavement	15,393 s. y.	.40	
44. Remove sidewalk	1,352 s. y.	.20	
45. Remove masonry and concrete	317 c. y.	5.00	
46. Earth excavation	232,561 c. y.	.45	
47. Shoulder borrow	1,460 c. y.	.45	
48. Overhaul	782,135 c. y. sta.	.015	
49. Overhaul	182,664 c. y. mi.	.12	
50. Trim and finish earth grade	56 sta.	10.00	
51. Grade A concrete	23 c. y.	25.00	
52. 12-in. Class A culverts	280 l. f.	1.50	
53. 15-in. Class B culverts	44 l. f.	2.20	
54. 18-in. Class B culverts	224 l. f.	2.50	
55. 24-in Class B culverts	176 l. f.	4.00	
56. 36-in. Class B culverts	312 l. f.	7.00	
57. 12-in. sewer	1,698 l. f.	1.45	
58. 6-in. sewer with open joints	6,550 l. f.	.60	
59. 12-in. sewer with open joints	1,280 l. f.	1.40	
60. 15-in. sewer with open joints	910 l. f.	1.65	
61. 18-in. sewer with open joints	1,200 l. f.	2.25	
62. 24-in. sewer	520 l. f.	3.25	
63. Manholes, 1-A	19 ea.	100.00	
64. Catch basin, 3-B	4 ea.	100.00	
65. Catch basin, 3-C	34 ea.	100.00	
66. Catch basin, 3-E	1 ea.	100.00	
67. Inlets, 5-C	8 ea.	80.00	
68. Catch basin, 6-B	4 ea.	100.00	
69. Catch basin, 6-C	27 ea.	100.00	
70. Adjust catch basin covers	1 ea.	25.00	
71. Stone masonry	24 c. y.	10.00	
72. Fine grading and clean-up	56 sta.	10.00	
73. Conc. curb and gutter (det. 5-A)	7,926 l. f.	1.30	
74. Conc. curb and gutter (det. 7-A)	9,675 l. f.	1.35	
75. Conc. curb and gutter, special	1,250 l. f.	1.30	
76. Concrete pavement, 9-in. uniform	40,572 s. y.	2.70	
77. Concrete end header (det. 20)	44 l. f.	1.30	
78. Concrete pavement, 7-in. uniform	20 s. y.	3.00	
79. Aggregate approaches (loose measure)	2,042 c. y.	2.60	
80. Stabilized earth shoulders, 6-in. mix	158 sta.	5.00	
81. Bituminous approach mixture	38 ton	10.00	
82. Guard posts	93 ea.	1.50	
83. Emulsified carbon black	4,136 s. y. pavmt.	.50	
84. Sodding	7,972 s. y.	.24	
85. Concrete right-of-way markers	17 ea.	4.50	
86. Obliterating abandoned road	3 ac.	70.00	
87. Water for wetting	4 M gal.	10.00	
88. Topsoil surface	2,870 c. y.	.45	
89. Part width construction	23 sta.	50.00	
90. Calcium chloride applied	2 ton	30.00	

HIGHWAY IMPROVEMENTS, ARIZONA

OWNER: Arizona State Highway Dept., Phoenix. W. R Hutchins, state highway engr.

PROJECT: Highway improvements, including plant-mix bituminous surfacing of approximately 10.5 miles of the Mesa-Florence Junction Highway in Maricopa and Pinal Counties, Ariz. Project begins about 8 miles east of Mesa, and runs in easterly and southerly direction. Involves grading, draining, and aggregate base course, in addition to the bituminous surfacing.

CONDITIONS: Contractor to furnish all materials and complete work by February 15, 1943. Rail and highway transportation facilities available. Minimum wage rates specified are: skilled labor, \$1.00 per hr.; semi-skilled, 68¾c.; and common, 62½c.

BIDS: Two bids were opened June 19, 1942, the contract low of \$325,706, and \$338,750.

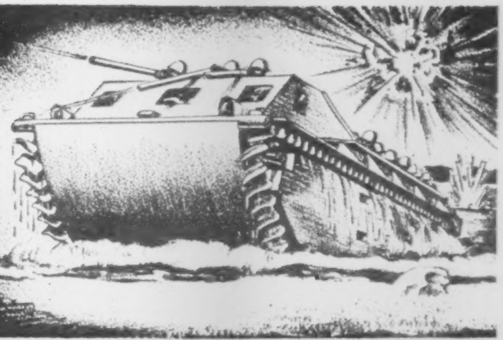
LIST OF BIDDERS:

1. N. G. Hill & Co., Phoenix, Ariz. (low bidder)	\$325,706
2. W. E. Hall Constr. Co., Phoenix, Ariz.	338,750

Item	Quan.	Unit Prices (1)	Unit Prices (2)
1. Roadway excavation, unclassified	62,521 c. y.	\$0.265	\$0.36
2. Drainage excavation, unclassified	8,687 c. y.	.36	.36
3. Structural excavation, unclassified	2,525 c. y.	2.00	2.00
4. Removal of old concrete	81 c. y.	12.00	12.50
5. Station yard overhaul	57,696 sta. y.	.02	.03
6. Cubic yard mile haul	1,203 cy. mi.	.24	.40
7. Imported borrow (complete in place)	20,346 ton	.42	.38
8. Coarse aggregate base course (CIP)	81,016 ton	1.06	.95
9. Fine aggregate base course (CIP)	48,138 ton	1.11	1.05
10. Sprinkling (CIP)	5,957 M gal.	1.80	2.50
11. Rolling	1,939 hr.	3.50	4.20
12. Class A concrete (incl. cement)	799 c. y.	28.00	32.05
13. Class B concrete (incl. cement)	19 c. y.	28.00	31.00
14. Reinforcing steel bars (CIP)	942 lb.	.10	.12
15. Treated timber (CIP)	75 M bm.	152.00	180.00
16. Floor seal (CIP)	1,143 s. y.	.70	1.00
17. 21-in. pl. conc. pipe (CIP except excav.)	343 l. f.	8.00	2.25

ADAPTABLE

TO ANY JOB



TO KEEP YOUR GRADERS ROLLING FOR VICTORY...

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition—check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

If you need help or advice on any of the above, see your local Adams distributor.

DESIGNED to be *adaptable to any job* the Marines may be called upon to do is the Corps' new "Alligator Tank" which travels on water or land. Equally *adaptable to any grading job* are Adams Motor Graders. . . . Smart operators utilize Adams power, traction, strength and speed on grading jobs that range from bank cutting to ditching and from heavy scarifying and oil mix to high-speed maintenance. They take jobs as they come and quickly adapt their Adams machines to them. . . . Today Adams machines are proving their adaptability in government service. Tomorrow they will prove even greater versatility on your peace-time jobs!

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Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

Adams

ROAD-BUILDING AND
EARTH-MOVING EQUIPMENT

18. Reset 24-in. corr. metal pipe (CIP)	110 l. f.	1.80	2.00
19. Reset 30-in. corr. met. pipe (CIP)	50 l. f.	2.10	2.00
20. Reset 36-in. corr. met. pipe (CIP)	30 l. f.	2.50	2.50
21. Reconstructing fence (CIP)	6,235 l. f.	.08	.10
22. Guide posts (CIP)	287 ea.	3.75	4.00
23. Right-of-way markers, type B (CIP)	59 ea.	4.25	4.00
24. Referenced survey monuments (CIP)	10 ea.	30.00	25.00
25. Plant mix (including haul)	15,804 ton	2.96	3.15
26. Road oil (SC-6) for plant mix (CIP in mixer)	871 ton	21.00	23.00
27. Road oil (SC-1) for prime coat (CIP on rd.)	77,462 gal.	.075	.08
28. Road oil (SC-2) for bitum. surf. trtmt. (CIP on road)	49,582 gal.	.08	.08
29. Road oil (SC-4) for bit. surf. trtmt. (CIP on road)	24,792 gal.	.09	.09
30. Placing plant mix	10.472 mi.	250.00	400.00
31. Screenings (CIP on road)	1,939 ton	3.70	4.00
32. Emulsified asph. (cl. A) for seal coat (CIP on road)	260 ton	28.00	30.00
33. Remov. conc. struct. (right of Sta. 435+84 and Sta. 542+06)	L. S.	300.00	750.00

HIGHWAY, ARKANSAS

OWNER: Arkansas State Highway Department, Little Rock.

PROJECT: Concrete paving 14.69 miles of State Highway 65 in Chicot County, Ark., from Lake Village to McGehee Rd. Involves all necessary excavation, Type 9-B cement concrete paving, construction of temporary crossings, culverts, and riprapping.

CONDITIONS: Contractor to furnish all materials and complete project in 160 working days. Rail and highway transportation facilities available. Minimum wage rates prevailing are: skilled labor, 65c. per hr.; semi-skilled, 40c.; and common, 30c.

BIDS: Two bids were received July 2, 1942, the contract low of $595,148, and $659,668.

LIST OF BIDDERS:

1. Gregory-Hogan, Little Rock, Ark. (contract)	$595,148
2. J. P. McNulty, Pine Bluff, Ark.	659,668

Item	Quan.	Unit Prices (1)	Unit Prices (2)
1. Common excavation	29,615 c.y.	$0.60	$0.70
2. Dry excavation, for structures	114 c.y.	2.50	3.00
3. Wet excavation, for structures	20 c.y.	5.00	3.00
4. Selected materials	18,664 c.y.	1.00	.70
5. Fine grading, subgrade and shoulders	190,625 c.y.	.06	.06
6. Portland cem. conc. pavmt. (Type 9-B)	190,625 s.y.	2.65	3.00
7. Traffic lane stripe	10,560 l.f.	.10	.80
8. Construct temporary crossings	3 ea.	200.00	100.00
9. Class A concrete	22.56 c.y.	30.00	30.00
10. Class B concrete	4.32 c.y.	30.00	30.00
11. Reinforcing steel	1,350 lb.	.10	.20
12. 24-in. non-rein. conc. pipe culv	8 l.f.	5.00	4.00
13. 30-in. non-rein. conc. pipe culv	24 l.f.	6.00	6.00
14. Riprap	300 c.y.	3.00	4.00
15. Remove and replace riprap	90 c.y.	3.00	4.00
16. Remove traffic service gravel and construct shoulders	15,573 c.y.	1.50	1.00
17. Remove and stockpile traffic service grav	13,225 c.y.	1.00	1.00

HIGHWAY, CALIFORNIA

OWNER: California Department of Public Works, Division of Highways, Sacramento.

PROJECT: Grading and bituminous surfacing (plant-mixed base) 13 miles of highway between Casmalia and Santa Maria, Santa Barbara County, Calif.

CONDITIONS: Contractor to furnish all materials except railroad rails, and complete work in 260 working days. Railway and highway transportation facilities available. Preference rating is A-1-a on ferrous materials; A-1-j on other materials. Lumber is to be rated in accordance with Order No. M-208. Stipulated wage rates are: skilled labor, $1.00 to $1.75 per hour; semi-skilled, 95c. to $1.375; and common, 87½c.

LIST OF BIDDERS: (Bids Oct. 21, 1942; award Nov. 18).

1. Frederickson & Watson Constr. Co., Oakland, and Fredericksen Bros., Emeryville, Calif. (contract)	$ 701,495
2. N. M. Ball Sons, Berkeley, Calif.	725,396
3. Clyde W. Wood, Inc., Los Angeles, Calif.	891,100
4. Bressi & Bevanda Constructors, Inc., Los Angeles, Calif.	1,116,012

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1. Clearing and grubbing	686 sta.	$9.30	$10.00	$26.00
2. Roadway excavation	530,000 c. y.	.27	.35	.50
3. Structure excavation	6,380 c. y.	1.80	2.00	2.50

4. Ditch and channel excav	1,750 c. y.	1.00	1.00
5. Overhaul	2,500,000 sta. y.	.0075	.005
6. Imported borrow, type A	113,000 c. y.	1.00	.81
7. Imported borrow, type B	30,000 c. y.	.80	.81
8. Imported borrow, type C	10,200 c. y.	1.20	1.50
9. Excavating sand drains	12,000 l. f.	1.25	.80
10. Filling material (sand drains)	1,750 c. y.	2.50	3.00
11. Develop water supply and furn. watering equip.	L.S.	2,000.00	3,000.00
12. Applying water	25,400 M gal.	1.75	1.75
13. Finishing roadway	686 sta.	10.00	7.00
14. Liquid asphalt, SC-2 (penet. trtmt.)	335 ton	13.50	12.00
15. Mineral aggregate (plant-mixed base)	59,500 ton	2.65	3.00
16. Paving asph., 85–100 (pl.-mix. base)	3,100 ton	11.80	10.00
17. Liquid asph., SC-2 (prime coat)	195 ton	13.50	11.00
18. Screenings (seal coat)	1,600 ton	4.00	5.00
19. Asphaltic emulsion (seal coat)	165 ton	20.00	16.00
20. Furn. treated Douglas Fir piling	1,850 l. f.	1.50	1.50
21. Drive tr. Doug. fir piles	57 ea.	35.00	100.00
22. Class A portland cem. conc. (struct.)	757 c. y.	42.00	35.00
23. As above, for slope paving	82 c. y.	28.00	30.00
24. Mesh reinforcement	80 s. y.	1.00	1.00
25. Place railroad rail reinforcement	59,000 lb.	.025	.03
26. Railroad rail railing	330 l. f.	2.90	1.50
27. Monuments	190 ea.	3.50	4.00
28. Culvert markers and guide posts	415 ea.	2.90	3.50
29. Laminated guard railing	4,800 l. f.	1.80	1.50
30. Temporary timber railing	L.S.	250.00	100.00
31. 12-in. non-rein. conc. pipe (2000-D)	440 l. f.	2.00	2.00
32. 18-in. non-rein. conc. pipe (2000-D)	2,340 l. f.	3.20	2.80
33. 24-in. non-rein. conc. pipe (2000-D)	1,270 l. f.	5.00	4.50
34. 30-in. rein. conc. pipe, std. str	48 l. f.	6.75	6.00
35. 36-in. rein. conc. pipe, std. str	430 l. f.	9.20	7.50
36. 36-in. rein. conc. pipe, ext. str	260 l. f.	10.30	9.50
37. 42-in. rein. conc. pipe, std. str	132 l. f.	12.50	10.00
38. 48-in. rein. conc. pipe, std. str	102 l. f.	15.80	16.00
39. 54-in. rein. conc. pipe, ext. str	195 l. f.	21.30	25.00
40. Portland cement conc., pipe encasement	24 c. y.	28.00	25.00
41. Salvaging pipe culverts	1,100 l. f.	1.00	1.00
42. Relay salvaged pipe	916 l. f.	.75	1.00
43. Redwood covers for drop inlets	12 ea.	4.80	10.00
44. Timber down drains	1,360 l. f.	1.20	1.00
45. Timber spillways	54 ea.	19.00	12.00
46. Remove existing bridge	L.S.	600.00	500.00

HIGHWAY, CALIFORNIA

OWNER: California State Highway Dept., Los Angeles, Cal

PROJECT: Improvement of 11.7 miles of highway in Sa Diego County, Calif. Involves grading, application of bitum nous surface, drainage structures, and construction of pla culverts. Priority rating is A-2.

CONDITIONS: Contractor to furnish all materials. Highwa transportation facilities available. Wage rates are: skill labor, $1.50 per hr.; semi-skilled, $1.00; and common, 87

BIDS: Four bids were opened February 26, 1942, rangin from the contract low of $655,785 to $820,427.

LOW BIDDERS:

1. Clyde W. Wood, Los Angeles, Calif. (contract)	$655,78
2. M. S. Ross and R. E. Hazard & Sons, San Diego, Calif.	784,31
3. Macco Constr. Co., Clearwater, Calif	796,55

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3
1. Clearing and grubbing	L. S.	$10,000.00	$7,500.00	$20,000.00
2. Roadway excavation	544,000 c. y.	.78	.96	1.00
3. Structure excavation	8,100 c. y.	2.80	1.75	1.50
4. Ditch and channel excav	15,500 c. y.	1.00	1.00	1.00
5. Overhaul	7,496,000 sta. y.	.004	.01	00
6. Finishing roadway	617 sta.	10.00	10.00	15.00
7. Liquid asph. SC-2, SC3 or SC-4 (bitum. surf. trtmt.)	2,530 ton	14.50	13.50	15.00
8. Prepare, mix and shape surf. (bitum. surf. trtmt.)	198,000 s. y.	.07	.09	.10
9. Liquid asph. SC-2 (seal coat)	67 ton	14.00	13.00	20.00
10. Class A portland cem. conc. (struct)	490 c. y.	35.00	40.00	50.00
11. Monuments	176 ea.	4.00	5.00	4.00
12. Laminated guard railing	2,120 l. f.	1.50	1.50	2.00
13. Culvert markers	260 ea.	2.50	3.50	5.00
14. Guide posts	285 ea.	2.50	3.40	5.00
15. New property fence	21 mi.	850.00	750.00	1,000.00
16. Drive gates	27 ea.	25.00	35.00	30.00
17. 8-in. corr. met. pipe, 16-ga	1,764 l. f.	1.40	1.45	1.00
18. 18-in. corr. met. pipe, 16-ga	2,496 l. f.	2.50	2.50	2.50
19. 24-in. corr. met pipe, 14-ga	2,614 l. f.	3.75	3.60	3.00
20. 30-in. corr. met. pipe, 14-ga	682 l. f.	4.75	4.50	4.00
21. 36-in. corr. met. pipe, 12-ga	56 l. f.	6.85	6.50	6.00
22. 36-in. corr. met pipe, 8-ga	166 l. f.	10.00	10.00	8.00
23. 48-in. corr. met pipe, 8-ga	182 l. f.	16.00	12.50	10.00
24. 48-in. corr. met. pipe, 12-ga	256 l. f.	12.50	9.00	8.00
25. 54-in. corr. met. pipe, 12-ga	66 l. f.	18.00	11.00	9.00
26. Spillway assemblies	88 ea.	20.00	30.00	20.00
27. 90-in. field assembled plate culvert.	75 l. f.	30.00	20.00	20.00
28. 90-in. field assembled plate culvert.	245 l. f.	33.00	20.00	25.00
29. 90-in. field assembled plate culvert.	135 l. f.	40.00	30.00	30.00
30. 105-in. field assembled plate culvert	45 l. f.	45.00	30.00	40.00
31. 24-in. perf. metal underdrain	132 l. f.	3.00	3.80	4.00
32. Rock filling material	40 c. y.	5.00	4.50	5.00
33. Reinforcing steel	49,000 lb.	.05	.08	.07

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HIGHWAY, CALIFORNIA

OWNER: California State Highway Dept., Sacramento.

PROJECT: Grading, crushed gravel base and plant-mixed surfacing 7.9 miles of highway near Linda Corners in Yuba County, Calif. Work includes clearing and grubbing; roadway structural, ditch and channel excavation, and appurtenant work.

CONDITIONS: Contractor to furnish all materials. Highway and rail transportation facilities available. Wage rates specified are: skilled labor, $1.06¼ to $1.75 per hour; semi-skilled, 90c. to $1.20; and common, 87½c. Project has A-1-j priority.

LIST OF BIDDERS: (Awarded July 2, 1942)

1. Hemstreet & Bell, Marysville, Calif. (contract)	$476,225
2. A. Teichert & Son, Inc., Sacramento, Calif	519,508
3. Fredericksen & Westbrook, Sacramento, Calif	615,454

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove concrete	15 c. y.	$10.00	$5.00	$12.50
2. Clear and grub	L. S.	12,000.00	10,000.00	5,000.00
3. Roadway excavation	87,000 c. y.	.38	.47	.40
4. Structural excavation	5,900 c. y.	1.60	1.50	2.00
5. Ditch and channel excavation	2,400 c. y.	.80	.50	1.25
6. Overhaul	532,500 sta. y.	.005	.005	.01
7. Imported borrow, type A	145,000 c. y.	.93	1.10	1.50
8. Imported borrow, type B	69,000 c. y.	.65	.62	1.00
9. Develop water supply and furnish water equipment	L. S.	1,000.00	1,000.00	2,500.00
10. Apply water	7,200 M gal.	2.00	1.50	1.50
11. Finish roadway	L. S.	4,000.00	5,000.00	6,000.00
12. Crushed gravel base	40,000 ton	2.10	2.17	2.50
13. Sand prime coat and penet. treatmt.	250 ton	3.50	3.50	5.00
14. Liquid asphalt, SC-2, prime coat and penet. trtmt	125 ton	20.00	20.00	20.00
15. Mineral aggregate plant-mix surf.	18,500 ton	3.40	3.90	2.50
16. Paving asph. plant-mix surf	925 ton	20.00	18.00	20.00
17. Asph. emulsion seal coat and paint binder	98 ton	30.00	25.00	30.00
18. Screen seal coat	1,430 ton	3.30	4.00	5.00
19. Timber structures	49 M bm.	125.00	120.00	200.00
20. Class A port. cem. conc. struct.	560 c. y.	26.50	35.00	50.00
21. Monuments	110 ea.	3.50	3.00	4.00
22. Laminated guard railing	360 l. f.	2.00	2.00	2.50
23. Timber barrier railing	380 l. f.	1.50	1.50	3.00
24. Culvert markers	86 ea.	3.00	3.00	3.50
25. Guide posts	160 ea.	3.00	3.00	3.50
26. Move and reset fences	2.7 mi.	500.00	550.00	1,250.00
27. 12-in. non-rein. conc. pipe (2,000-D)	1,272 l. f.	2.00	1.75	1.70
28. 18-in. pipe, as above	1,920 l. f.	2.25	2.75	3.00
29. 24-in. pipe, as above	387 l. f.	4.00	4.00	6.00
30. 30-in. pipe, as above	297 l. f.	5.00	5.00	7.50
31. 36-in. pipe, as above	399 l. f.	7.00	7.00	11.00
32. Cement treated backfill	340 c. y.	7.00	15.00	20.00
33. Salvage pipe culverts	1,300 l. f.	.80	.75	1.25
34. Relay salvaged pipe	500 l. f.	.60	.75	1.25
35. Timber spillways	16 ea.	15.00	25.00	25.00
36. Timber down drains	100 l.f.	.80	1.00	1.25

HIGHWAY RELOCATION CONNECTICUT

OWNER: Connecticut State Highway Dept., Hartford.

PROJECT: Bituminous macadam paving 17,055 feet of highway in connection with the relocation of Route 12 in towns of Groton and Ledyard, Conn. Pavement width 22-ft.; thickness 8½-in.

CONDITIONS: Contractor to furnish all materials and complete work in 210 days. Rail, highway and water transportation facilities available. Traffic must be maintained at junctions and crossings, and on portions of old road where relocated roadway is identical or where it crosses. Wage rates are: skilled labor, $1.37½ to $1.80 per hour; semi-skilled, 75c. to $1.25; and common, 75c.

BIDS: Five bids were received June 15, 1942, ranging from the low of $423,668 to $526,360. Previously bids were asked on this job May 25, but all bids were rejected and the project was readvertised.

LIST OF BIDDERS:

1. Oneglia & Gervasini, Torrington, Conn. (low bidder)	$423,668
2. A. I. Savin Constr. Co., East Hartford, Conn	463,342
3. N. D. Maselli Corp., Bloomfield, Conn	506,641
4. L. Suzio Constr. Co., Meriden, Conn	507,192
5. N. Benvenuti & Sons, New London, Conn	526,360

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	17,955 l.f.	$1.00	$2.00	$0
2. Earth excavation	147,942 c.y.	.45	1.00	
3. Rock excavation	68,464 c.y.	1.75	1.00	2
4. Trench excav. 0 to 6-ft. deep	3,338 c.y.	1.30	2.00	2
5. Trench excav. 6 to 10-ft. deep	70 c.y.	2.00	2.00	2
6. Borrow	42,509 c.y.	.35	.50	.
7. Formation of subgrade	46,539 s.y.	.12	.10	.
8. Shape and clean slopes and shoulders	17,955 l.f.	.40	1.00	.
9. Sub-base	27,200 c.y.	1.25	.60	1.
10. Gravel fill	9,291 c.y.	1.25	.60	1.
11. Broken stone (for base course)	18,117 ton	2.25	2.50	2.
12. Broken stone (for bit. mac. surf. crse.)	7,376 ton	2.75	2.50	3.
13. Rolled gravel surface	403 c.y.	1.25	1.50	1.
14. Traffic bound gravel surface	125 c.y.	1.25	1.50	1.
15. Bit. mat'l. for surface treatment	40,027 gal.	.16	.12	.1
16. Bit. mat'l. for bit. mac. surf. crse	117,778 gal.	.16	.12	.1
17. Furn. and apply sand cover	40,027 s.y.	.05	.05	.0
18. Class B concrete	268 c.y.	20.00	20.00	18.
19. Concrete for steps and copings	3 c.y.	35.00	30.00	50.
20. Portland cement	400 bbl.	2.75	2.50	3.
21. 15-in. vitrified clay pipe	135 l.f.	1.31	2.00	2.
22. 18-in. vitrified clay pipe	1,176 l.f.	1.93	2.20	2.
23. 24-in. vitrified clay pipe	834 l.f.	3.12	2.50	4.
24. 48-in. rein. concrete pipe	80 l.f.	9.10	7.00	12.
25. 60-in. rein. concrete pipe	256 l.f.	14.33	12.00	18.
26. Underdrains with 6-in. perf. conc. pipe	5,975 l.f.	1.20	1.50	1.7
27. Outlets for underdr. with 6-in. conc pipe	547 l.f.	1.00	1.50	1.5
28. Paved ditches	50 s.y.	3.00	1.50	4.0
29. Plain concrete park curbing	100 l.f.	1.00	1.00	2.0
30. Guide posts	2,742 ea.	3.30	3.00	3.0
31. Stone wall fence	9,000 l.f.	1.25	1.00	1.2
32. Barways	12 ea.	13.00	12.00	15.0
33. Board fence	1,215 l.f.	.55	.50	.0
34. Concrete marker post	2 ea.	16.00	15.00	25.0
35. Maintenance of traffic	L.S.	2,000.00	5,000.00	2,500.0

HIGHWAY, GEORGIA

OWNER: Georgia State Highway Commission, Atlanta.

PROJECT: Improvement of 8.422 miles of highway in Chattahoochee County, Ga. Involves all excavation, necessary drainage structures, plain cement concrete paving and curbing, bituminous material, aggregate, and roadside improvement.

CONDITIONS: Contractor to furnish all materials and complete work in 240 working days. Rail and highway transportation facilities available. Minimum wage rates specified are: skilled labor, 60c. per hr.; semi-skilled, 40c.; and common, 30c.

BIDS: Six bids were opened April 17, 1942, ranging from the contract low of $1,001,104 to $1,165,332.

LIST OF BIDDERS:

1. Claussen-Lawrence Constr. Co., Augusta, Ga., W. L. Cobb Constr. Co., Decatur, Ga., and Coffee Constr. Co., Eastman, Ga., (contract)	$1,001,104
2. Hugh McMath Constr. Co., Columbus, Ga., and Pittman Constr. Co., Atlanta, Ga.	1,095,174
3. Hardaway Constr. Co., Columbus, Ga.	1,098,515
4. William F. Rowe, Jr., Augusta, Ga.	1,110,764
5. M. J. Carroll Constr. Co., Leesburg, Fla.	1,113,326
6. H. E. Wolfe Constr. Co., St. Augustine, Fla.	1,165,332

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing (240.3 acres)	L. S.	$15,000.00	$18,000.00	$36,000.00
2. Common and borrow excav. (incl. shoulder constr. and reducing back slopes)	1,239,179 c. y.	.22	.24	.24
3. Ditch excavation	10,252 c. y.	.25	.50	.15
4. Channel excavation	2,625 c. y.	.60	.75	.35
5. Structure excavation	6,595 c. y.	1.00	1.00	.90
6. Hydraulic settlement of fills	12,200 c. y.	.05	.10	.05
7. Overhaul on excavation	185,143 sta. y.	.0035	.005	.005
8. 15-in. pipe sidedrain	60 l. f.	1.25	1.35	1.25
9. 18-in. pipe center drain	1,845 l. f.	1.50	1.65	1.50
10. 24-in. pipe center drain	2,180 l. f.	2.50	2.50	2.50
11. 30-in. pipe center drain	1,163 l. f.	3.00	2.75	3.00
12. 18-in. concrete pipe center drain exten	54 l. f.	3.50	3.75	3.50
13. 30-in. conc. pipe center drain exten	42 l. f.	4.50	4.25	3.75
14. Remove culv. pipe, center or side drain	91 l. f.	1.00	.75	1.00
15. Class B concrete headwalls	113.9 c. y.	25.00	30.00	25.00
16. Class A conc. headwalls removed	3,308.16 c. y.	25.00	27.50	27.50
17. Class B conc. headwalls removed	15.22 c. y.	5.00	10.00	5.00
18. Bar reinforcing steel	391,488 lb.	.05	.005	.06
19. Concrete rt.-of-way markers	181 ea.	2.50	2.00	3.00
20. Selected mat'l subgrade treatment	28,625 c. y.	.30	.55	.35
21. Overhaul on subgrade treatment mat'l	26,379 c. y.	.04	.03	.03
22. Mixing subgrade treatment mat'l	26,834 s. y.	.015	.05	.02
23. Selected mat'l culvert foundation	194 c. y.	3.00	3.00	1.00
24. Remove, relay 6-in. water main	1,370 l. f.	1.00	2.00	1.00
25. Grouted riprap apron	60 s. y.	4.00	3.50	2.00
26. 9-7-9-in. plain cem. conc. paving	257,440 s. y.	1.94	1.96	2.07

BEWARE of Wire Rope "Gremlins"

Gremlins—those sly imps who delight in bedeviling our flying forces—will also get your wire rope if you don't watch out.

The way to combat these little trouble makers is to give your wire rope constant and proper care. Be on the alert at all times. *Guard especially against the following conditions, which are common causes of premature wire rope failures:*

(1) Improper or Insufficient Lubrication
(2) Using Wire Rope of Incorrect Size, Construction or Grade
(3) Improper Selection of Sheaves
(4) Improper Care of Sheaves
(5) Sheaves Out of Line
(6) An Inadequate Factor of Safety
(7) An Excessive Fleet Angle
(8) Sudden Jerks or Pulls
(9) Kinking

The importance of using all means and methods of increasing wire rope efficiency—thereby saving steel for other vital purposes—cannot be over-emphasized. Our experienced Engineering Department is at the service of all wire rope users. Feel free to write us about any wire rope problems which may be giving you trouble.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS
5909 KENNERLY AVENUE

ESTABLISHED 1857
ST. LOUIS, MISSOURI, U. S. A.

"HERCULES" (RED-STRAND) WIRE ROPE

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
DENVER . . . 1554 Wazee Street

SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South

27. Concrete raised edge curb	15,293 l. f.	.05	.06	.05
28. Rein. conc. approach slabs	426.66 s. y.	5.00	6.50	4.50
29. 6-in. bitum. bound base, R. R. crossing	53 s. y.	1.00	3.50	2.00
30. Bit. mat'l for bitum. bound base	212 gal.	.17	.25	.25
31. Bituminous prime	4,547 gal.	.18	.20	.25
32. Hot application bitum. mat'l	4,951 gal.	.13	.20	.15
33. Seal application bitum. mat'l	4,951 gal.	.15	.20	.15
34. Coarse aggregate cover mat'l	314.5 ton	4.25	4.50	4.00
35. Fine aggregate cover mat'l	127 ton	4.50	4.50	4.00
36. Conc. drop inlet spillways, type B	74 ea.	30.00	50.00	50.00
37. Conc. drop inlet spillways, type A	15 ea.	60.00	45.00	35.00
38. 9x6-in. conc. header with raised edge	270 l. f.	.60	1.00	.60
39. 10-in. Cl. B conc. slope drain pipe	3,050 l. f.	1.00	1.00	.75
40. 8-in. Cl. B conc. slope drain pipe.	300 l. f.	.90	.80	.90
41. Guard rail with type C conc. posts	1,008 l. f.	1.25	1.75	1.50
42. Cl. A conc. guard rail connections	8.16 c. y.	40.00	40.00	35.00
43. Bar rein. steel guard rail conn	3,008 lb.	.05	.065	.10
44. Finishing and dressing	309,745 s. y.	.02	.03	.02
45. Bermeda sprigging	627,997 s. y.	.017	.02	.02
46. Strip sod back slopes	77,368 s. y.	.10	.20	.20
47. Mulching	77,368 s. y.	.01	.05	.04
48. Commercial fertilizer, 8-4-4	41,480 lb.	.02	.025	.015
49. Topsoil (furn. by contractor)	11,376 c. y.	.50	1.25	.45
50. Sod ditch checks	10,008 s. y.	.45	.45	.40
51. Spreader boards	21,227 l. f.	.50	.70	.50
52. Solid sod flumes	720 s. y.	.04	.03	.03
53. Curved back slopes	56,443 l. f.	.03	.05	.03
54. Ground preparation	373,314 s. y.	.60	.45	.50
55. Clay gravel base	4,131 c. y.	.03	.03	.02
56. Overhaul on clay gravel base	58,662 c. y.	.01	.03	.01

HIGHWAY, FRANKLIN COUNTY GEORGIA

OWNER: Georgia State Highway Dept., Atlanta.

PROJECT: Paving 7.113 miles of Carnesville-Commerce Road in Franklin County, Georgia, with 7-5-7-in. plain concrete pavement. Includes clearing and grubbing, excavation, subgrade treatment, curbing, grassing shoulders, and drainage structures.

CONDITIONS: Contractor to furnish all materials and complete work in 140 working days. Highway facilities available to site of work. Wage rates are: skilled labor, 60c. per hour; semi-skilled, 45c.; and common, 30.

BIDS: Three bids were received October 2, 1942, ranging from the contract low of $208,812 to $230,274.

LIST OF BIDDERS:

1. W. L. Cobb, Inc., Decatur, Ga. (contract)	$208,812
2. Hugh McMath Constr. Co., Columbus, Ga	225,951
3. M. J. Carroll Contracting Co., Leesburg, Fla	230,274

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L.S.	$2,250.00	$10,000.00	$2,500.00
2. Unclassified excav. and borrow, including shoulder construction	13,407 c. y.	.45	.52	.70
3. Grouted stone apron	55 s. y.	3.00	3.00	3.00
4. Selected mat'l. subgrade trtmt	5,075 c. y.	.75	1.50	.90
5. Mix subgrade treatment mat'l	27,005 s. y.	.10	.10	.05
6. 7-5-7-in. plain cem. conc. paving with type B lumber sealed transverse joints	83,897 s. y.	2.13	2.20	2.41
7. Concrete raised edge curb	17,386 l. f.	.05	.12	.06
8. Grassing shoulders	76,939 s. y.	.045	.04	.03
9. Finishing and dressing	130,796 s. y.	.045	.04	.03
10. Concrete spillways, type 1	12 ea.	45.00	25.00	25.00
11. Concrete spillways, type 2	5 ea.	45.00	25.00	26.00
12. Concrete spillways, type 3	58 ea.	45.00	25.00	25.00
13. Concrete spillways, type 4	3 ea.	45.00	25.00	28.90
14. Concrete slope drain	410 l. f.	2.50	2.00	1.15
15. 8-in. Cl. B conc. pipe slope drain	357 l. f.	1.00	2.00	1.00

HIGHWAY PAVING, IOWA

OWNER: Iowa State Highway Commission, Ames, Iowa.

PROJECT: Concrete paving 6.606 miles of access roadway from Des Moines, Polk County, Iowa, to west entrance of Des Moines Ordnance Plant. In addition to paving work, the project involves construction of driveways, sidewalks, curbing, paving intakes, slope drain, and incidental concrete masonry.

CONDITIONS: Rail and highway transportation facilities available. Contractor to furnish all materials and complete work in 50 working days. Minimum wage rates stipulated are: skilled labor, 75c. per hr.; semi-skilled, 60c.; and common. 5

BIDS: Four bids were opened April 21, 1942, ranging fr the contract low of $279,386 to $365,390.

LIST OF BIDDERS:

1. Fred Carlson Co., Decorah, Iowa (contract)	$279,3
2. McLaughlin & Sons, Des Moines, Iowa	353,8
3. Booth & Olson, Sioux City, Iowa	362,3
4. Western Constr. Corp., Sioux City, Iowa	365,3

Item	Quan.	Unit Prices (1)	(2)	
1. Std. conc. pavement, Class 2 or 3 coarse aggregate	100,958.6 s. y.	$2.65	$3.36	$3
2. Concrete driveway	1,175 s. f.	.30	.45	
3. Concrete sidewalk	24,280 s. f.	.24	.32	
4. 3-in. curb	4,680 l. f.	.075	.12	
5. Type A flumes	7 ea.	90.00	90.00	85
6. Concrete slope drain	40 l. f.	1.50	3.00	2
7. Single type E paving intakes	3 ea.	125.00	150.00	150
8. Double type E paving intakes	17 ea.	200.00	225.00	175
9. Type E-M paving intake	1 ea.	250.00	300.00	225
10. Concrete masonry	15 c. y.	40.00	30.00	40

HIGHWAY, NEW JERSEY

OWNER: New Jersey State Highway Dept., Trenton.

PROJECT: Construction of Port Street Access Road betwe Route 25 and Doremus Avenue, Newark, Essex County, N. Pavement, approximately 0.764 miles long, is of macadam Project involves all necessary excavation, topsoiling, bas course, drainage structures and bridge.

CONDITIONS: The state highway department is constructin project for Bureau of Public Roads. Rail, highway and wate transportation facilities available. Contractor to furnish al materials except the 12-in. cast iron pipe. Existing castings ar to be used in construction of manholes. Priority rating AA-5 All labor to be employed from lists of U. S. Employment Serv ice in Newark. Minimum wage rates are: skilled labor, $1.2 per hour; semi-skilled, 65c.; and common, 50c. per hour.

BIDS: Four bids were received January 13, 1943, ranging fro the contract low of $221,868 to $308,209.

LIST OF BIDDERS:

1. H. L. Harrison & Son, Inc., Newark, N. J. (contract)	$221,86
2. N. J. Asphalt & Paving Co., Jersey City, N. J	226,16
3. S. B. Miller Contracting Corp., Long Island City, N. Y.	273,21
4. Franklin Contracting Co., Newark, N. J	308,20

Item	Quan.	Unit Prices (1)	(2)
1. Removal of swamp sod	1,819 c. y.	$1.25	$2.40
2. Roadway excavation, earth	447 c. y.	1.10	2.00
3. Borrow excavation	63,618 c. y.	.97	.95
4. Ditch excavation	207 c. y.	1.50	1.50
5. Subgrade	200 s. y.	.20	.30
6. 4-in. topsoiling	9,736 s. y.	.35	.30
7. Macadam base course	4,289 s. y.	.75	.75
8. Pavement, type T, bottom course	710 ton	9.75	10.75
9. Concrete base course, 8-in. thick	200 s. y.	3.60	3.50
10. Modified penet. macadam intermediate course, 3-in. thick	4,289 s. y.	.80	.90
11. Pavement, type T, top course	590 ton	9.75	12.00
12. 12-in. conc. or clay sewer pipe	93 l. f.	2.80	3.50
13. 18-in. conc. or clay sewer pipe	1,605 l. f.	4.15	3.75
14. 24-in. conc. or clay sewer pipe	1,794 l. f.	5.40	4.50
15. 12-in. cast iron pipe (furnished)	32 l. f.	10.00	3.00
16. Manholes, using existing castings	2 ea.	150.00	100.00
17. Inlets, type B and D, wood tops	15 ea.	145.00	125.00
18. Reset inlet heads	2 ea.	20.00	10.00
19. White concrete vertical curb, 7x19-in	3,809 l. f.	1.25	1.30
20. Reset granite curb	751 l. f.	1.35	1.50
21. Concrete header, 12x12-in	85 l. f.	1.15	1.10
22. Concrete header, 12x22-in	200 l. f.	1.55	1.60
23. Class C concrete	1 c. y.	30.00	15.00
24. Wood guard fence	2,033 l. f.	1.65	1.87
25. Stone ballast	50 ton	4.00	5.00
26. Grouted rubble slope protection	21 s. y.	3.50	3.00
27. Type B and D inlets, concrete tops	2 ea.	135.00	100.00
28. Concrete island pavement, 7-in. thick	197 s. y.	3.40	3.60
29. White conc. sloping curb, 15x8-in	396 l. f.	1.50	1.475
30. Earth excav., subsurface structures	100 c. y.	5.00	4.005
31. Foundation excavation, bridge	432 c. y.	15.00	22.25
32. Class B concrete, bridge struct	284 c. y.	36.35	44.70
33. Class C concrete, bridge struct	831 c. y.	25.30	15.60
34. Concrete balustrade	525 l. f.	8.00	6.50
35. Structural steel	252,900 lb.	.05	.04
36. Reinforcing steel, structures	50,350 lb.	.09	.08
37. Flooring in cofferdams	3 M bm.	200.00	120.00
38. Treated timber	48 M bm.	200.00	220.00
39. Timber piles	4,200 l. f.	1.00	1.10
40. Treated timber piles	7,080 l. f.	1.60	1.65
41. Untreated timber	73 M bm.	240.00	215.00

A minute lost is lost forever!

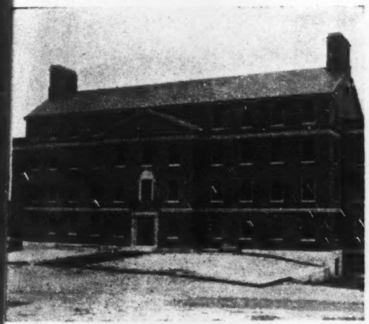
TIME SAVED IN CONSTRUCTION
. . . IS WORTH MORE THAN MONEY

Nowadays, we can't afford to figure the value of Time in mere dollars and cents. Time is valued in terms of production, in terms of armament, in terms of Victory.

That's why so many American industries depend upon concrete for fast and efficient construction work, repairs, or alterations. In many cases, this means Lehigh Early Strength Cement which makes a finer, denser concrete in 1/3 to 1/5 of normal curing time. In 24 to 48 hours it equals the strength of normal cement at 7 days . . . and so saves vitally productive *Time*.

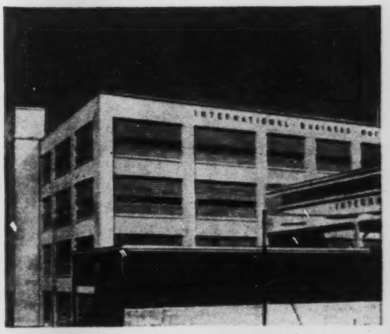
Hundreds of cases may be cited showing the savings made by Lehigh Early Strength Cement. What it has done for others it can do for you. The Lehigh Service Department will help solve your special problems.

Lehigh
CEMENT



3-WAY SAVING: Use of Lehigh Early Strength Cement in the 3 upper floors of New Hampshire's State Hospital saved the cost of 13,000 feet of panel forms, 15 days of construction time, and 15 days' heat protection cost.

SEWAGE DISPOSAL PLANT: In this Southern Army Camp, Lehigh Early Strength Cement helped get an essential sewage disposal plant ready for operation in an amazingly short time. It was also used for roads.

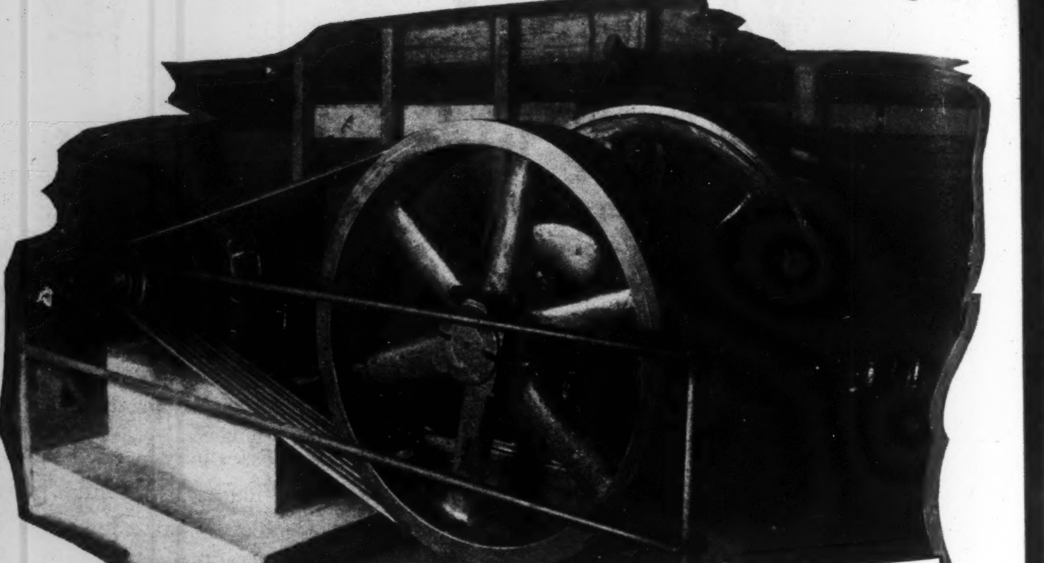


SPEEDS MUNITIONS MAKING: Lehigh Early Strength Cement permitted forms to be stripped from face of all buildings in this International Business Machine Company's munitions plant in 5 days instead of 21.

EARLY STRENGTH CEMENT for service-strength concrete in a **hurry**

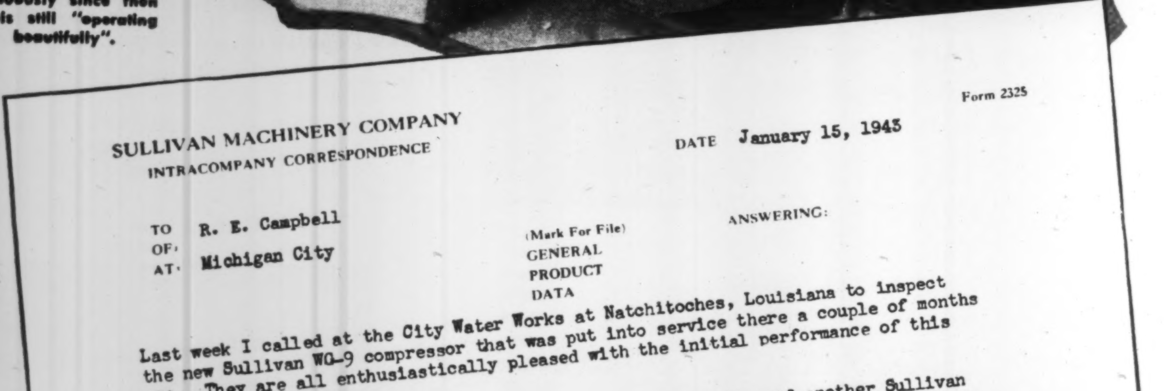
LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

24 Hours a day for 24 Years ....



The VETERAN

This is the Sullivan WG-6 Compressor installed in the city of Natchitoches, La. Sept. 17, 1919 and which has served almost continuously since then and is still "operating beautifully".



Form 2325

SULLIVAN MACHINERY COMPANY
INTRACOMPANY CORRESPONDENCE

DATE January 15, 1943

TO R. E. Campbell
OF·
AT· Michigan City

ANSWERING:

(Mark For File)
GENERAL
PRODUCT
DATA

Last week I called at the City Water Works at Natchitoches, Louisiana to inspect the new Sullivan WG-9 compressor that was put into service there a couple of months ago. They are all enthusiastically pleased with the initial performance of this WG-9 unit.

While at the plant they insisted that I observe the operation of another Sullivan compressor that they claimed had operated over 200,000 hours. This was the class WG-6 compressor size 11 by 10 shop number 4716 that was shipped on September 17, 1919 and has been operating on practically a 24 hour basis since that date in connection with the pumping of the municipal water supply.

This WG-6 compressor with this 200,000 hours to its credit was operating beautifully and the plant superintendant and the engineer were just as proud of it as they were of the new WG-9 unit.

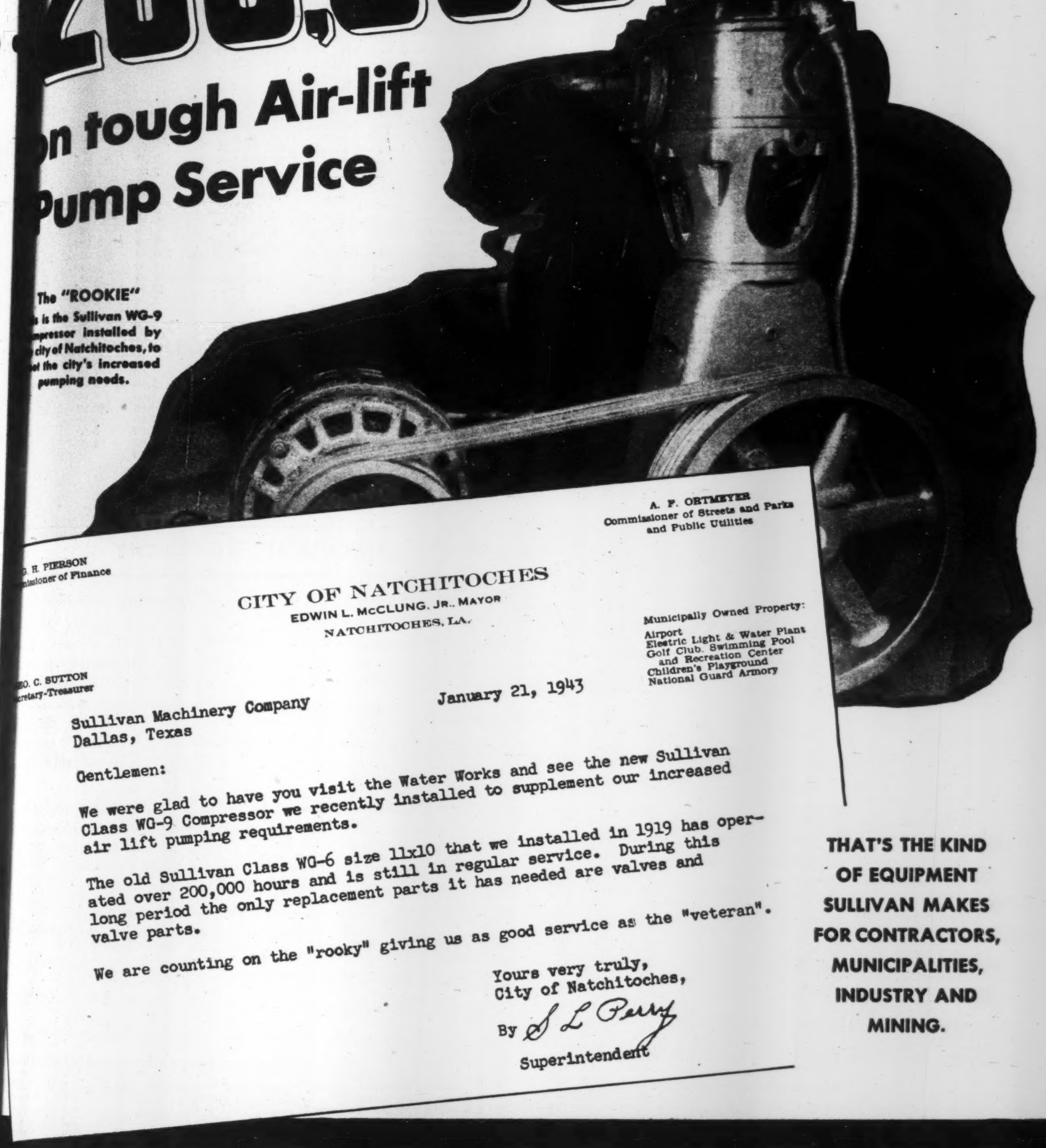
J A Mayes

SULLIVAN BRANCH OFFICES

BIRMINGHAM, ALA...619 N. 10th St.
BOSTON, MASS...104 Brookline Ave.
BUTTE, MONT.........24 W. Granite St.
CHICAGO, ILL. 307 N. Michigan Ave.
CLAREMONT, N.H.......1938 Main St.
DALLAS, TEX.......1914 Commerce St.
DENVER, COLO...1815 California St.
DULUTH, MINN..........1 East Michigan St.
EL PASO, TEX...........117 North Kansas St.
HUNTINGTON, W. VA...........728 8th Ave.
KNOXVILLE, TENN...201 Medical Arts Bldg.
LOS ANGELES, CALIF...2900 Santa Fe Ave.
MIDDLESBORO, KY...........501 No. 19th St.
NEW YORK CITY, N. Y...........30 Church St.
PITTSBURGH, PA...47 Terminal Way, So. Side
PORTLAND, ORE.....1631 N. W. Thurman St.
SALT LAKE CITY, UTAH..117 W. 2nd South St.
SAN FRANCISCO, CALIF.........145 Tenth St.
SEATTLE, WASH...........3410 First Ave. South
ST. LOUIS, MO.........................2639 Locust St.
WASHINGTON, D.C.............1427 I St., N. W.

. . 200,000 Hours

n tough Air-lift Pump Service



The "ROOKIE"
s is the Sullivan WG-9 mpressor installed by city of Natchitoches, to ot the city's increased pumping needs.

A. P. ORTMEYER
Commissioner of Streets and Parks
and Public Utilities

. H. PIERSON
missioner of Finance

CITY OF NATCHITOCHES
EDWIN L. McCLUNG, JR., MAYOR
NATCHITOCHES, LA.

Municipally Owned Property:
Airport
Electric Light & Water Plant
Golf Club. Swimming Pool
and Recreation Center
Children's Playground
National Guard Armory

EO. C. SUTTON
cretary-Treasurer

January 21, 1943

Sullivan Machinery Company
Dallas, Texas

Gentlemen:

We were glad to have you visit the Water Works and see the new Sullivan Class WG-9 Compressor we recently installed to supplement our increased air lift pumping requirements.

The old Sullivan Class WG-6 size 11x10 that we installed in 1919 has operated over 200,000 hours and is still in regular service. During this long period the only replacement parts it has needed are valves and valve parts.

We are counting on the "rooky" giving us as good service as the "veteran".

Yours very truly,
City of Natchitoches,

By S L Perry
Superintendent

THAT'S THE KIND OF EQUIPMENT SULLIVAN MAKES FOR CONTRACTORS, MUNICIPALITIES, INDUSTRY AND MINING.

SULLIVAN

AIR COMPRESSORS . . . PORTABLE AND STATIONARY

HIGHWAY, NEW JERSEY

OWNER: New Jersey State Highway Dept.. Trenton, N. J.
PROJECT: Construction of 1.199 miles of plain concrete pavement, Sections 3 and 4A, from Phipps Road to Mount Hope Mineral Railroad, Morris County, N. J. Roadway pavement width 24-ft., thickness 10-in. Includes necessary clearing, stripping, excavation, grading, drainage structures, pavement and bridge.
CONDITIONS: Rail and highway transportation facilities available. Work to be completed in 140 working days. Contractor to furnish all materials. Wage rates are: skilled labor, $1.75 to $2.25 per hr.; semi-skilled, $1.05 to $1.65; and common, $1.12½.
BIDS: Two bids were opened June 15, 1942, the contract low of $824,871, and $866,862.
LIST OF BIDDERS:

1. Franklin Contracting Co., Newark, N. J. (contract)	$824,871
2. S. J. Groves & Son Co., Ridgefield Park, N. J.	866,862

Item	Quan.	Unit Prices (1)	Unit Prices (2)
1. Clearing site	L. S.	$11,000.00	$15,000.00
2. Stripping	11 ac.	100.00	300.00
3. Roadway excavation	108,594 c. y.	.40	.80
4. Roadway excavation (rock)	10,000 c. y.	4.00	2.15
5. Pavement excavation	2,831 s. y.	.50	.60
6. Wet excavation	26,909 c. y.	.40	.60
7. Borrow excavation	138,759 c. y.	.45	.60
8. Channel excavation	21,786 c y.	.80	.65
9. Channel excavation (rock)	4,000 c. y.	4.00	2.15
10. Rock excavation	500 c. y.	8.00	6.00
11. Earth excavation	100 c. y.	3.00	3.00
12. Subgrade	42,411 c. y.	.15	.25
13. Stone shoulders	11,137 c. y.	1.00	1.25
14. 4-in. topsoil	90,219 c. y.	.30	.25
15. 6-in. topsoil	909 c. y.	.30	.30
16. Conc. bag slope protection	128 c. y.	15.00	30.00
17. 4-in. macadam base course	14,751 s. y.	.80	.90
18. 6-in. macadam base course	1,091 s. y.	1.00	1.30
19. 5-in. pavement, "A"	154 s. y.	3.00	....
20. 5-in. pavement, "T" (alternate)	154 s. y.	....	2.00
21. 8-in. concrete base course	1,057 s. y.	2.40	3.20
22. 3-in. modified penet. macadam	15,580 s. y.	.90	1.00
23. 2½-in. pavement, "A"	1,057 s. y.	1.40	....
24. 2½-in. pavement, "T" (alternate)	1,057 s. y.	....	1.30
25. 1-in. pavement, "A"	15,734 s. y.	.60	....
26. 1-in. pavement, "T" (alternate)	15,734 s. y.	....	.65
27. Resurfacing pavement	11 ton	20.00	20.00
28. 10-in. conc. pavement surface	40,578 s. y.	3.95	3.50
29. 18-in. bridge approach slabs	776 s. y.	8.00	6.00
30. 4-in. conc. joint sills	6,850 s. y.	2.50	2.00
31. Calcium chloride	7 ton	40.00	40.00
32. Federal project marker posts	2 ea.	25.00	25.00
33. Underdrain, type F	1,000 l. f.	1.20	1.00
34. 18-in. rein. concrete pipe	3,828 l. f.	2.40	2.70
35. 24-in. rein. concrete pipe	268 l. f.	3.00	4.50
36. 30-in. rein. concrete pipe	72 l. f.	5.00	7.20
37. 36-in. rein. concrete pipe	68 l. f.	7.50	8.90
38. 6-in vitr. clay pipe	40 l. f.	1.50	1.25
39. 18-in. cast iron pipe	20 l. f.	7.00	6.00
40. Inlets	75 ea.	125.00	150.00
41. Grouted rubble gutter	87 s. y.	3.00	2.00
42. 7x20-in. concrete curb	17,996 l. f.	1.25	1.30
43. 15x18-in. white conc. curb	395 l. f.	1.50	1.35
44. Headwalls	64 c. y.	30.00	35.00
45. Wooden guard fence	12,914 l. f.	1.25	1.90
46. Broken stone or screened gravel	34 c. y.	3.00	4.00
47. Wood barricade	158 l. f.	3.00	3.00
48. Stone ballast	57 ton	2.25	4.00
49. 12x12-in. concrete header	173 l. f.	1.25	1.50
50. 12x22-in. concrete header	135 l. f.	2.40	2.50
51. Ditch excavation	590 c. y.	2.00	1.00
52. 2½-in. asbestos	350 l. f.	2.00	.75
53. Foundation excavation	3,788 c. y.	12.40	6.00
54. Class B conc. in structures	1,896 c. y.	36.00	47.00
55. Class C conc. in structures	3,933 c. y.	28.90	27.50
56. Concrete balustrade	609 l. f.	7.00	8.00
57. Reinforcing steel in structures	428,755 lb.	.075	.09
58. Structural steel	5,865 lb.	.12	.22
59. Waterproofing	7,258 s. f.	.40	.40
60. Lighting units	4 ea.	75.00	66.00
61. Pull box, frame and cover	1 ea.	75.00	77.00
62. 2-in. conduit	310 l. f.	2.00	.80
63. Timber piles	4,460 l. f.	1.10	1.50
64. Remove Parker Road bridge	L. S.	2,500.00	1,100.00
65. Remove Mt. Hope — Mt. Pl. bridge	L. S.	1,750.00	1,100.00

HIGHWAY, NEW MEXICO

OWNER: New Mexico State Highway Department, Santa Fe.
PROJECT: Grading, minor drainage structures, three creosoted timber box culverts each over 20-ft. clear span, base surfacing, double penetration wearing top, and other miscellaneous construction on U. S. Highway 80 between Lordsburg an Road Forks, Hidalgo County, N. M. Length 7.718 miles.
CONDITIONS: Contractor to furnish all material and complete project in 225 weather working days. Railway faciliti available to Lordsburg, and highway transportation to site o work. Wage rates are: skilled labor, 80c. to $1.50 per hr.; semi-skilled, 60 to 80c.; and common, 45 to 55c.
LIST OF BIDDERS: (Bids opened July 29, 1942.)

1. Brown Bros., Albuquerque, N. M. (contract)	$294,60
2. Martin & Cowart, Albuquerque, N. M	320,38
3. Skousen Bros., Albuquerque, N. M	333,33

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1. Remove old drainage structures	L. S.	$100.00	$500.00	$2,000.0
2. Remove obstructions	L. S.	100.00	25.00	100.0
3. Unclassified excavation	212,500 c. y.	.18	.30	.4
4. Excavation for structures	350 c. y.	2.00	2.00	2.0
5. Excav. for pipe culverts	320 c. y.	2.00	2.00	2.0
6. Overhaul	132,000 sta. y.	.02	.03	.0
7. Haul	761,000 ¼-mi. y.	.03	.03	.0
8. Rolling, sheepsfoot roller	1,819 hr.	6.00	5.00	4.0
9. Base course surfacing, No. 1 aggr.	40,870 ton	.90	.80	.7
10. Base course surfacing, No. 2 aggr.	43,159 ton	.80	.70	.7
11. Watering	3,528 M gal.	3.00	3.50	2.5
12. Treated timber, box culverts	172.46 M bm.	150.00	175.00	200.0
13. Conc. culv., 24-in. 4½-in. shell	324 l. f.	5.00	7.50	9.0
14. Conc. culv., 30-in. 5½-in. shell	240 l. f.	7.00	9.00	10.0
15. Conc. mon. and marker, unrein.	2 ea.	25.00	25.00	50.0
16. Gates, Texas type	4 ea.	3.00	5.00	10.0
17. Bracing	13 ea.	5.00	4.00	2.0
18. Rt.-of-way and sta. markers	80 ea.	3.00	5.00	4.0
19. Remove and rebuild fence	40,710 l. f.	.03	.04	.0
20. Obliterating old road	7 mi.	100.00	100.00	200.0
21. Contour ditches	400 l. f.	.10	.05	.2
22. Ballast	97,045 ton	.60	.60	.5
23. Mechanical tamping	320 hr.	5.00	5.00	10.0
24. Rolling, steel-tired roller	154 hr.	7.00	6.00	5.0
25. Preparation of base course	7.718 mi.	400.00	700.00	500.0
26. Liquid. asph. road oil, type MC-3	1,941 bbl.	7.00	5.50	5.0
27. Cover material	3,434 ton	4.00	5.00	4.0
28. Asphalt	1,855 bbl.	7.00	6.00	5.0
29. New posts for rebuilding fence	2,467 ea.	.30	.35	.5

HIGHWAY, KENTUCKY

OWNER: Kentucky Department of Highways, Frankfort.
PROJECT: Non-reinforced cement concrete paving 10.727 miles of Elizabethtown-Fort Knox Road, Hardin County. Ky., beginning at end of improved street in Elizabethtown and extending to Radcliff. Roadway width 22-ft.; thickness of concrete 8-in. Bids on alternate types of surfacing were asked as follows: cement concrete pavement (reinforced); cement concrete pavement (non-reinforced); rock asphalt-cement concrete base; or bituminous concrete Class I—cement concrete base.

CONDITIONS: Contractor to furnish all materials and complete work in 175 calendar days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.50 per hr.; semi-skilled, 70c. to $1.50; common, 67½c.
LIST OF BIDDERS: Bids opened May 15, 1942.

1. Ellis, Kelly Co., and Fount Crow, Owensboro, Ky. (Non-reinforced concrete) (contract)	$421,791
2. White Consolidated, Inc., Chicago, Ill. (Reinforced concrete)	444,116
3. F. C. Gorrell & Sons, Russellville, Ky. (Non-reinforced concrete)	449,024

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1. Remove trees and stumps	5 ea.	$10.00	$10.00	$10.00
2. Clearing and grubbing	8.24 ac.	20.00	100.00	50.00
3. Roadway excavation	18,006 c.y.	.45	.60	.50
4. Struct. excav., unclassified	1,264 c.y.	2.00	1.50	2.00
5. Rural lip curb box inlet, type 2	1 ea.	100.00	100.00	75.00
6. Flumes	300 l.f.	2.00	2.25	2.00
7. Flume inlets	16 ea.	75.00	75.00	75.00
8. Manholes	3 ea.	125.00	90.00	125.00
9. 15-in. rein. conc. culv. pipe	228 l.f.	1.75	1.35	2.00
10. 18-in. rein. conc. culv. pipe	219 l.f.	2.10	2.20	2.25
11. 24-in. rein. conc. culv. pipe	414 l.f.	2.90	3.00	3.50
12. 30-in. rein. conc. culv. pipe	705 l.f.	3.75	4.00	4.50
13. 36-in. rein. conc. culv. pipe	87 l.f.	4.85	5.00	6.00
14. 15-in. rein. conc. entrance pipe	772 l.f.	1.60	1.50	1.50
15. 18-in. rein. conc. entrance pipe	110 l.f.	2.00	2.50	2.00
16. 24-in. rein. conc. entrance pipe	88 l.f.	2.65	3.25	3.00
17. Concrete sidewalk	2,320 s.y.	2.25	2.20	2.25
18. Class A concrete	55.5 c.y.	25.00	27.50	35.00

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19. 6-in. concrete pavement	195 s.y.	2.50	2.15	2.50
20. Water	5,555 hund. gal.	.20	.25	.25
21. Scarifying and reshaping	10,000 s.y.	.05	.05	.03
22. Final dressing	566 sta.	10.00	12.50	10.00
23. Removing pipe	1,219 l.f.	.50	.75	.50
24. Relaying pipe	136 l.f.	.50	1.00	.75
25. Remove pipe headwalls	7 ea.	5.00	60.00	10.00
26. Remove and rebuild stone masonry headwalls	4 ea.	20.00	150.00	25.00
27. Remove concrete masonry	31 c.y.	5.00	4.00	7.50
28. Remove concrete sidewalk	13 s.y.	.50	.25	.50
29. Remove concrete pavement	28 s.y.	1.00	.40	1.00
30. Remove concrete gutter	41 l.f.	.50	.25	.50
31. Remove concrete curb	24 l.f.	.50	.25	.50
32. Remove, reset hedge fence	180 l.f.	1.00	.50	.50
33. Concrete ditch paving	600 l.f.	2.00	1.00	1.50
34. Surface ditches	400 l.f.	.25	.10	.10
35. Pavement cross-overs	4 ea.	200.00	100.00	200.00
36. 15-in. curb inlets	9 ea.	45.00	75.00	100.00
37. 18-in. curb inlets	2 ea.	50.00	150.00	100.00
38. Crushed limestone for entrances	510 ton	2.50	2.50	2.50
39. Steel reinforcement	2,460 lb.	.08	.07	.10
40. Struct. excavation, common	75 c.y.	2.00	1.00	2.00
41. Struct. excav., solid rock	5 c.y.	5.00	3.00	10.00
42. Remove existing structures	1 ea.	1,000.00	150.00	2,500.00
43. Cem. conc. pavement (reinforced)	157,510 s.y.	....	2.45	....
44. Lip curb	17,500 l.f.	....	.15	....
45. Trench and shoulder excavation	14,700 c.y.	....	.35	....
46. Integral curb	4,945 l.f.	....	.50	....
47. Permanent traffic stripe	62,015 l.f.	....	.05	....
48. Cem. conc. pavement (non-rein.) alt	157,510 s.y.	2.35	....	2.48
49. Lip curb (Alternate)	17,600 l.f.	.10	....	.08
50. Trench and shoulder excavation (Alt.)	16,800 c.y.	.30	....	.40
51. Integral curb (Alt.)	4,945 l.f.	.45	....	.50
52. Permanent traffic stripe (Alt.)	62,015 l.f.	.03	....	.04

HIGHWAY, MICHIGAN

OWNER: Michigan State Highway Dept., Lansing.

PROJECT: Construction of 1.460 miles of concrete pavement, Ecorse Road, State Route 17, in Washtenaw County, Mich. Includes necessary grading, drainage structures, and concrete pavement (9-in. uniform) in widths varying from 22-ft. to 55-ft.

CONDITIONS: Contractor to furnish all materials and complete work by September 1, 1942. Rail and highway transportation facilities available. Wage rates are: skilled labor, \$1.62½ per hr.; semi-skilled, \$1.37½; and common, 90c.

LIST OF BIDDERS: Bids opened April 22, 1942.

Bidder	Amount
1. Bridgeport Core Sand Co., Saginaw, Mich. (contract)	\$513,023
2. L. A. Davidson, Lansing, Mich.	527,098

		Unit Prices	
Item	Quan.	(1)	(2)
1. Clearing	12 ac.	\$125.00	\$130.00
2. Grubbing	332 s. rd.	1.25	1.00
3. Remove trees, 8 to 12-in. dia	15 ea.	15.00	15.00
4. Remove trees, 13 to 24-in. dia	7 ea.	20.00	20.00
5. Remove trees, 25 to 36-in. dia	4 ea.	30.00	40.00
6. Remove trees, 37-in. or more in dia	1 ea.	50.00	50.00
7. Remove old pavement	14,646 s. y.	.40	.50
8. Remove masonry and concrete	50 c. y.	5.00	10.00
9. Earth excavation	280,262 c. y.	.35	.40
10. Overhaul	465,516 sta. y.	.01	.01
11. Overhaul	205,668 yd. mi.	.12	.12
12. Trim and finish earth grade, 22-ft. pavement	16 sta.	10.00	10.00
13. As above, for 33-ft. pavement	110 sta.	15.00	15.00
14. As above, for 44-ft. pavement	32 sta.	18.00	20.00
15. As above, for 55-ft. pavement	8 sta.	20.00	30.00
16. 18-in. Class B culverts	844 l. f.	2.75	2.50
17. 24-in. Class B culverts	68 l. f.	4.00	5.00
18. 30-in. Class B culverts	394 l. f.	5.50	5.50
19. 12-in. sewer	1,453 l. f.	1.30	1.50
20. 15-in. sewer	130 l. f.	1.50	2.50
21. 18-in. sewer	210 l. f.	2.20	2.60
22. 12-in. sewer with open joints	1,817 l. f.	1.30	1.50
23. 15-in. sewer with open joints	130 l. f.	1.50	2.50
24. 6-in. edge drain sewer	6,000 l. f.	.45	.50
25. Manholes, type 1-A	9 ea.	110.00	100.00
26. Manholes, type 1-C	3 ea.	110.00	100.00
27. Catch basins, type 3-B	2 ea.	110.00	100.00
28. Catch basins, type 3-D	2 ea.	110.00	100.00
29. Inlets, type 5-C	55 ea.	105.00	60.00
30. Inlets, type 9-B	4 ea.	110.00	100.00
31. Plain riprap	55 c. y.	5.00	10.00
32. Fine grade and cleanup for 22-ft. pavmt	16 sta.	10.00	10.00
33. As above, 33-ft. pavement	110 sta.	15.00	15.00
34. As above, 44-ft. pavement	32 sta.	18.00	20.00
35. As above for 55-ft. pavement	8 sta.	20.00	30.00
36. Concrete pavement, 9-in. uniform	64,984 s. y.	2.55	2.30
37. Concrete roll curb	28,644 l. f.	1.00	1.00
38. Spec. conc. curb and gutter	1,320 l. f.	1.50	1.50
39. Aggregate approaches (loose meas.)	1,700 c. y.	2.00	2.00
40. Gravel shoulders 4-in. compacted	20,680 s. y.	.30	.25
41. Salvaged grav. should. 4-in. compact	8,100 s. y.	.22	.20
42. Topsoil surface (loose meas.)	5,553 c. y.	.40	.50
43. Bituminous approach mixture	150 ton	9.00	10.00
44. Guard posts	612 ea.	1.50	1.50
45. Sodding	33,250 s. y.	.28	.25
46. Maintaining traffic	L. S.	500.00	500.00
47. Bridges over pavement	2 ea.	150.00	100.00
48. Obliterating abandoned road	8 ac.	80.00	100.00
49. Emulsified carbon black	7,466 s.y. pavmt.	.25	1.00
50. Calcium chloride applied	11 ton	35.00	40.00
51. Clearing	9 ac.	125.00	130
52. Grubbing	1,376 s. rd.	1.10	1
53. Remove trees, 8 to 12-in. dia	6 ea.	15.00	15
54. Removing trees, 13 to 24-in. dia	5 ea.	20.00	20
55. Removing trees, 25 to 36-in. dia	3 ea.	30.00	40
56. Earth excavation	134,781 c. y.	.35	
57. Overhaul	14,770 sta. y.	.01	
58. Overhaul	101,999 yd. mi.	.12	
59. Trim and finish earth grade, 44-ft. pavement	29 sta.	15.00	20
60. 18-in. class B culvert	136 l. f.	2.75	2
61. 48-in. class B culvert	592 l. f.	10.00	15
62. 12-in. sewer	449 l. f.	1.30	1
63. Manhole, type 1-C	1 ea.	110.00	100
64. Inlet, type 5-C	16 ea.	105.00	60
65. Plain riprap	15 c. y.	5.00	10
66. Fine grading and cleanup for 44-ft. pavement	29 sta.	15.00	20
67. Conc. pavement, 9-in. uniform	15,878 s. y.	2.55	2
68. Concrete roll curb	5,730 l. f.	1.00	1
69. Gravel shoulders, 4-in., compacted	2,358 s. y.	.30	
70. Salvaged gravel shoulders, 4-in. comp.	4,000 s. y.	.22	
71. Topsoil surface (loose meas.)	2,457 c. y.	.40	
72. Guard posts	267 ea.	1.50	1
73. Sodding	11,936 s. y.	.28	
74. Emulsified Carbon black	2,195 s.y. pavmt.	.25	1
75. Removing old culvert (6-ft. box)	1 ea.	200.00	100

HIGHWAY, NEVADA

OWNER: Nevada Department of Highways, Carson Cit Nev.; Robert A. Allen, state highway engineer.

PROJECT: Plant-mix bituminous surfacing 12.48 miles Route 5, Clark County, Nevada. Extends from 14th St. Las Vegas to a point approximately 11.6 miles southeast the city. Roadway width 22-ft.; 7-ft. gravel shoulders. Surfacing thickness: 3-in. oiled gravel, and 1-in. bituminou surfacing.

CONDITIONS: Contractor to furnish all materials an complete work in 175 days. Rail and highway transportatio facilities available. Wage rates are: skilled labor, \$1.25 pe hr.; semi-skilled 90c.; and common, 80c.

LIST OF BIDDERS: Bids opened April 11, 1942.

Bidder	Amount
1. Wallace & Wallace, Phoenix, Ariz. (contract)	\$509,66
2. Dodge Constr. Co., Inc., Fallon, Nev.	555,55

		Unit Prices	
Item	Quan.	(1)	(2)
1. Construction signs	L. S.	\$750.00	\$979.6
2. Remove fence	460 l. f.	.10	.10
3. Remove concrete	10 c. y.	7.50	10.00
4. Remove culvert pipe	2,155 l. f.	1.25	1.00
5. Remove culvert inlets and outlets	24 ea.	25.00	10.00
6. Move signs (set by engineers)	Force Acc.	450.00	450.00
7. Adjust misc. items (set by engr.)	Force Acc.	200.00	200.00
8. Roadway excavation	132,000 c. y.	.35	.30
9. Drainage excavation	4,827 c. y.	.35	.50
10. V-type ditches	32 sta.	.05	10.00
11. Borrow	37,557 c. y.	.28	.25
12. Slope rounding	741 sta.	5.00	7.50
13. Overhaul	379,081 sta. y.	.01	.01
14. Overhaul	51,134 y. mi.	.15	.15
15. Structural excavation	7,211 c. y.	1.25	1.50
16. Backfill	5,363 c. y.	.50	.50
17. Subgrade, type B	454,736 s. y.	.02	.02
18. Roadside clean-up (set by engr.)	Force Acc.	1,000.00	1,000.00
19. Water	7,872 M gal.	1.50	2.00
20. Type 1, gravel base	145,952 ton	.50	.45
21. Type 2, gravel base (1-in. size)	78,445 ton	.50	.65
22. Gravel surface	18,037 ton	55	.65
23. Liquid asphalt, type MC-1 (prime)	445 ton	24.75	21.50
24. Liquid asphalt, type RC-2 (roadmix and plant-mix seal)	118 ton	22.80	20.00
25. Blotter sand	35 ton	3.00	3.00
26. Roadmix	5,964 s. y.	.28	.10
27. Liquid asphalt, type SC-3 (roadmix)	37 ton	22.60	18.00
28. Liquid asphalt, type SC-6 (plantmix)	1,844 ton	20.00	19.00
29. Class F-2 plantmix bitum. surface	35,548 ton	2.20	2.25
30. Class F-2 plantmix bitum. surf., for dikes.	1,351 ton	2.70	2.50
31. Class A concrete	415 c. y.	28.00	35.00
32. Class B concrete	1,504 c. y.	26.00	35.00
33. Timber	124 Mbm.	112.00	150.00
34. Relay culvert pipe	736 l. f.	1.50	1.00
35. Move culvert inlets and outlets	35 ea.	25.00	20.00
36. Class A conc. curb and gutter	593 c. y.	26.00	30.00
37. Bituminous foot-paths	6,763 s. y.	.85	1.00
38. Beam type metal guard rail	180 l. f.	2.50	2.00
39. Culvert markers	200 ea.	3.00	4.00
40. Guide posts	20 ea.	4.00	4.00
41. Reconstruct fence	460 l. f.	.15	.10
42. Monuments	83 ea.	5.00	4.00
43. 6-in. plain concrete pipe	8 l. f.	1.50	1.75
44. 8-in. plain concrete pipe	435 l. f.	1.25	2.00
45. 12-in. plain concrete pipe	78 l. f.	2.30	3.00
46. 15-in. plain concrete pipe	95 l. f.	3.00	4.00
47. 18-in. plain concrete pipe	3,454 l. f.	3.60	5.00
48. 24-in. plain concrete pipe	2,097 l. f.	4.85	7.00
49. 30-in. plain concrete pipe	1,380 l. f.	7.20	9.00
50. 36-in. plain concrete pipe	1,692 l. f.	9.20	12.00
51. Concrete neutral bars (2-ft. 4-in.)	427 ea.	1.50	1.50
52. Concrete neutral bars (5-ft. 2-in.)	458 ea.	3.00	2.50

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HIGHWAY GRADING AND CULVERTS, MISSOURI

OWNER: Missouri State Highway Commission, Jefferson City, Mo.; C. W. Brown, chief engineer.

PROJECT: Grading and construction of culverts in connection with 1.287 miles of highway improvement (Troost Avenue Extension) in Jackson County, Mo. Shoulder width when completed 66-ft.

CONDITIONS: Improvement is located in metropolitan area. Contractor to furnish all materials and complete work by March 1, 1943. Rail and highway transportation facilities available. Wage rates are: skilled and semi-skilled labor, 70c. to $1.375 per hour; and common, 70c.

BIDS: Three bids were opened November 21, 1942, ranging from the low of $129,658 to $158,950. Low bidder specified plain cement pipe for 15, 18 and 24-in. culvert pipe, and reinforced concrete pipe for the 30 and 42-in. sizes. The low bid is based on an AA-2 priority rating for materials, supplies and equipment repairs.

LIST OF BIDDERS:

1. George Bennett Constr. Co., Kansas City, Kan. (low)	$129,658
2. Cameron, Joyce & Co., Keokuk, Iowa	135,978
3. O'Dell & Riney Constr. Co., Hannibal, Mo.	158,950

Item	Quan.	Unit Prices (1)	(2)	(3)
1: Clearing	6.8 a. c.	$100.00	$125.00	$170.00
2. Grubbing	5.3 ac.	100.00	175.00	250.00
3. Hedge removal	1.35 hund. ft.	20.00	60.00	20.00
4. Class A excavation	64,741 c. y.	.48	.50	.47
5. Class C excavation	49,606 c. y.	1.25	1.50	1.65
6. Class 3 excav., structures	724 c. y.	3.25	3.00	4.00
7: Compact. embankment (rolling)	106,064 c. y.	.06	.04	.08
8. Compaction in cuts (rolling)	11,400 c. y.	.40	.40	.70
9. Overhaul	20,030 ½-mi. y.	.20	.12	.20
10. Remove sidewalks	12 s. y.	1.00	.20	2.00
11. Water for compacting, rolling	21,144 hund. gal.	.001	.01	.001
12. Class B conc.; box culverts	166.6 c. y.	45.00	33.00	60.00
13. Cl. B conc.; other than box culv	14.4 c. y.	65.00	45.00	70.00
14. 12-in. conc. pipe, culvert	152 l. f.	2.90	2.50	2.00
15. 15-in. conc. pipe, culvert	452 l. f.	3.50	3.00	3.00
16. 18-in. conc. pipe, culvert	400 l. f.	4.25	4.00	4.00
17. 24-in. conc. pipe, culvert	86 l. f.	5.25	5.00	5.00
18. 30-in. conc. pipe, culvert	195 l. f.	7.50*	6.00	8.00
19. 42-in. conc. pipe, culvert	122 l. f.	11.50*	8.00	10.00
20. Reinforcing steel	17,100 lb.	.075	.06	.08
21. Grouted light stone revetment	141 s. y.	6.50	4.00	10.00
22. Remove existing structures	L.S.	350.00	100.00	500.00

* *Reinforced concrete pipe.*

HIGHWAYS, VIRGINIA

OWNER: Virginia Department of Highways, Richmond, Va.

PROJECT: Construction of 13.76 miles of two-lane concrete highway in Warwick, James City and York Counties, Virginia, on Route 168, from a point 0.77 miles south of the intersection of Rich Neck Road to Williamsburg. Each lane, of 9-in. plain concrete, is 11-ft. wide. Project also includes 20-ft. soil bituminous surface treated center strip.

CONDITIONS: Contractor to furnish all materials and complete work in 250 days. Rail, highway and water transportation facilities available at, or near, site of work. Minimum wage rates are: skilled labor, 60c. per hour; semi-skilled, 35c.; and common, 30c.

BIDS: Three bids were received December 22, 1942, ranging from the contract low of $1,143,397 to $1,247,663.

LIST OF BIDDERS:

1. W. H. Scott, Inc., Franklin, Va. (contract)	$1,143,397
2. Bero Engr. & Constr. Corp., Blackstone, Va.	1,157,213
3. Keeley Constr. Co., Harrisonburg, Va.	1,247,663

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	32 ac.	$400.00	$225.00	$350.00
2. Regular excavation	226,600 c. y.	.65	.65	.75
3. Borrow excavation	9,200 c. y.	.75	.75	1.50
4. Concrete, Class A	313 c. y.	64.00	48.00	55.00
5. Concrete, Class B	670 c. y.	64.00	35.00	45.00
6. Metal reinforcement	25,991 lb.	.10	.07	
7. Concrete right-of-way monuments	40 ea.	3.00	3.50	
8. Subgrade underdrains, CD–1 or CD–2	1,800 l. f.	1.00	.95	
9. 15-in. concrete pipe	322 l. f.	2.25	3.25	
10. 18-in. pipe	683 l. f.	2.90	4.00	
11. 24-in. pipe	325 l. f.	4.25	4.75	
12. 30-in. pipe	45 l. f.	6.50	6.00	
13. 36-in. pipe	156 l. f.	9.00	7.75	
14. Relay pipe	600 l. f.	2.50	2.50	
15. 12-in. pipe	100 l. f.	1.20	2.75	
16. Concrete, Class C	109 c. y.	64.00	25.00	
17. Riprap	500 s. y.	4.50	2.65	
18. Timber piling	3,800 l. f.	1.40	1.00	
19. Reset right-of-way monuments	56 ea.	1.50	2.00	
20. Federal-aid markers	2 ea.	6.50	5.00	
21. High early strength std. gutter for entrances and street connections	40 l. f.	4.00	1.25	
22. Plain comb. conc. curb and gutter	11,650 l. f.	2.40	1.35	
23. Special curb drop inlets	12 ea.	125.00	125.00	
24. Catch basins to be adjusted	5 ea.	50.00	20.00	
25. Manholes to be adjusted	10 ea.	15.00	25.00	
26. 3-in. wrought iron pipe	50 l. f.	4.00	1.00	
27. 6-in. wrought iron pipe	50 l. f.	5.50	1.75	
28. Reflectorized advance warning signs	6 ea.	25.00	50.00	
29. Subgrade treatment	100,142 c. y.	1.30	1.75	
30. Soil for grade changes and connections (10-in.)	22,106 c. y.	2.00	2.95	
31. 6-in. soil for fill and secondary connections	1,000 c. y.	2.00	2.95	
32. Soil (backfill around forms)	3,520 c. y.	2.00	2.95	
33. Soil (irreg. out of center strip)	7,008 c. y.	2.00	2.95	
34. Scarify and reshape exist. 20-ft. center strip	81,800 s. y.	.15	.30	
35. No. 9 stone for entrances	125 ton	3.50	4.25	
36. 8-in. waterbound macadam for intersect.	3,100 s. y.	3.00	1.30	
37. RT–3 to RT–11 bituminous mat'l	4,465 gal.	.20	.15	
38. Covering material	155 ton	3.50	4.25	
39. RT–3 or RT–4 bituminous mat'l	54,120 gal.	.20	.15	
40. RT–5 or RT–6 bituminous mat'l	81,180 gal.	.20	.15	
41. Covering material	4,871 ton	3.50	4.25	
42. Sand covering material	1,624 ton	3.00	3.40	
43. 4-ft. by 6-in. conc. median strip	1,200 l. f.	2.00	1.25	
44. 9-in. plain concrete pavement	178,596 s. y.	3.27	3.17	

HIGHWAY, VIRGINIA

OWNER: Virginia Department of Highways, Richmond.

PROJECT: Construction of 5.1 miles of Highway No. 1 north of Newport News in Warwick County, Va. Of dual ty pavement, the two outside lanes, each 11-ft. wide, are to be 9 plain concrete, and the 20-ft. center lane is to be bitumino surface.

CONDITIONS: Contractor to furnish all material and co plete project by April 22, 1943. Rail, highway and water tra portation facilities available. Winter construction methods be necessary. Wage rates are: skilled labor, $1.50 per hou semi-skilled, 90c.; and common, 50c. Construction of roadw in low area presents added drainage problems as water sta near ground surface after rains.

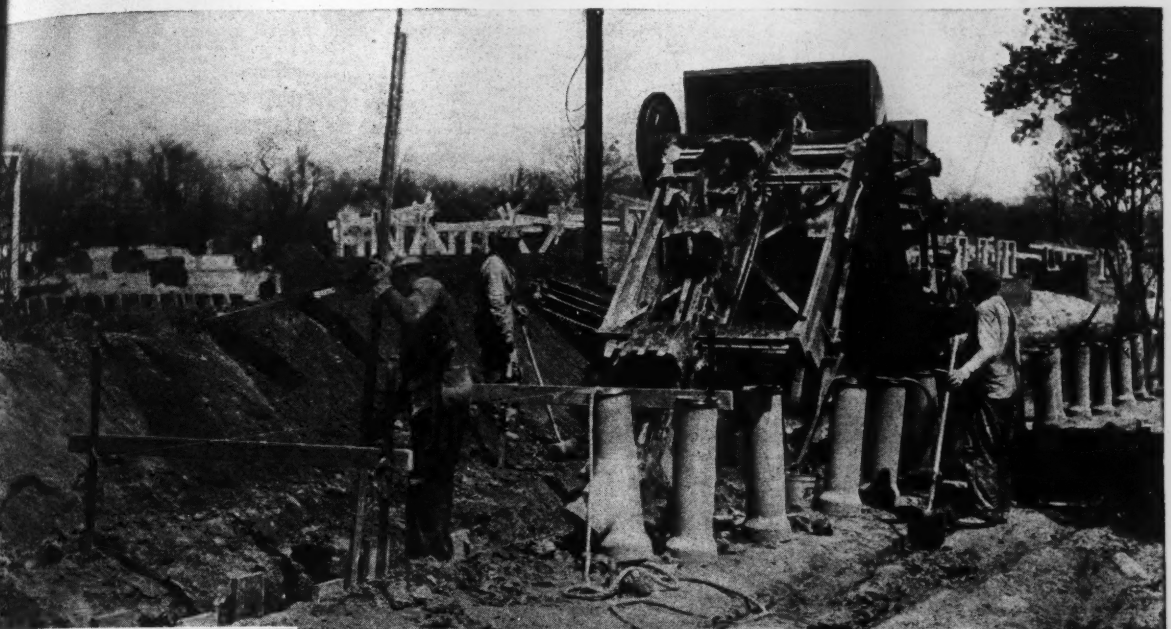
BIDS: Two bids were opened October 6, 1942, the contract lo of $439,119, and $476,088.

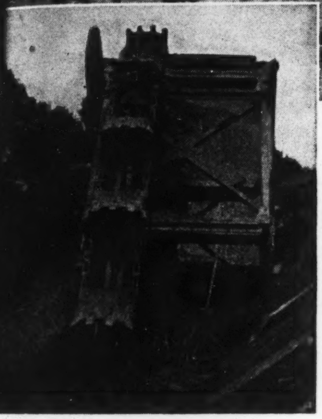
LIST OF BIDDERS:

1. Hechler Brothers, Highland Springs, Va. (contract)	$439,11
2. Bero Eng. & Constr. Co., Blackstone, Va.	476,0

Item	Quan.	Unit Prices (1)
1. Clearing and grubbing	4 ac.	$300.00
2. Regular excavation	21,089 c. y.	.75
3. Borrow excavation	54,549 c. y.	1.15
4. Concrete, Class A	151 c. y.	45.00
5. Concrete, Class C	62 c. y.	40.00
6. Metal reinforcing	10,662 lb.	.10
7. Conc. rt.-of-way monuments	10 ea.	3.00
8. 15-in. concrete pipe	459 l. f.	2.25
9. 18-in. pipe	1,353 l. f.	2.80
10. 24-in. pipe	990 l. f.	4.00
11. 24-in. concrete pipe	15 l. f.	4.00
12. Pipe to be relaid	1,295 l. f.	2.00
13. Radial concrete curb	108 l. f.	1.00
14. Std. h. e. s. concrete gutter	101 l. f.	2.50
15. Plain concrete curb and gutter	1,194 l. f.	2.00
16. Federal-aid project markers	3 ea.	5.00
17. Curb drop inlets	5 ea.	125.00
18. Standard drop inlets	1 ea.	125.00
19. Material for subgrade treatment	20,303 c. y.	1.30
20. 6-in. soil	560 c. y.	2.00
21. Soil (bring up irregularities)	3,737 c. y.	1.50
22. 9 to 18-in. soil	2,247 c. y.	1.50
23. Cinder block end walls to be rebuilt	77 c. y.	20.00
24. No. 9 stone or crushed gravel (stabilized)	9,346 ton	5.00
25. RT-3 or RT-4 bituminous material	20,158 gal.	.20
26. RT-5 or RT-6 bitum. material	30,238 gal.	.20
27. Grade B sand	604 ton	4.00
28. Cover material	2,268 ton	6.00
29. High early str. conc. (street approaches)	384 s. y.	4.00
30. 9-in. plain concrete	66.584 s. y.	3.35

PARSONS





Parsons Trencher cutting ditch between pavement edge and steep bank. Only an offset boom could work in these restricted quarters successfully.

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TRENCHING EQUIPMENT

HIGHWAY, VIRGINIA

OWNER: Virginia Department of Highways, Richmond.

PROJECT: Construction of 4.5 miles of waterbound macadam roadway with mixed-in-place bituminous surface on Route No. 11 from 4.1 miles east of the eastern city limits of Dublin, Pulaski County, Va., to a point 0.37 miles west of the eastern city line.

CONDITIONS: Contractor to furnish all materials and complete work by June 21, 1943. Rail and highway transportation facilities available. Wage rates stipulated are: skilled labor, $1.25 per hour; semi-skilled, 80c.; and common, 45c. Sixty percent of the excavation required is rock.

BIDS: Four bids were opened October 6, 1942, ranging from the contract low of $412,217 to $644,987.

LIST OF BIDDERS:

1. Pendleton Constr. Corp., Wytheville, Va. (contract)	$412.217
2. Keeley Constr. Co., Harrisonburg, Va.	476,369
3. Sutton Co., Inc., Radford, Va., and Sam Finley, Inc., Roanoke, Va.	484,714
4. Bero Engr. & Constr. Corp., Blackstone, Va.	644,987

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	1 ac.	$200.00	$300.00	$200.00
2. Regular excavation	248,752 c. y.	.75	.83	.83
3. Brrow excavation	6,796 c. y.	.60	.75	.83
4. Class A concrete	205 c. y.	25.00	22.00	30.00
5. Class C concrete	77 c. y.	25.00	25.00	40.00
6. Metal reinforcing	24,855 lb.	.06	.07	.08
7. Right-of-way monuments	108 ea.	2.50	2.00	2.40
8. Center drain, CD-1 or CD-2	1,644 l. f.	.50	.60	.45
9. 18-in. concrete pipe	2,496 l. f.	2.50	2.50	3.00
10. 18-in. pipe (3000D)	165 l. f.	2.50	3.00	3.25
11. 24-in. pipe	633 l. f.	3.25	3.50	4.00
12. 24-in. pipe (3000D)	204 l. f.	3.50	3.75	4.50
13. 36-in. pipe (3000D)	297 l. f.	7.00	8.00	8.50
14. 18-in. concrete pipe	27 l. f.	2.50	2.50	3.00
15. ¾-in. galvanized iron pipe	60 l. f.	.50	.40	1.00
16. Reset right-of-way monument	4 ea.	2.00	1.00	5.00
17. Fed.-aid project markers	3 ea.	4.00	5.00	5.00
18. Reset project marker	1 ea.	3.00	3.00	2.00
19. Std. curb catch basins	8 ea.	150.00	40.00	100.00
20. Class X concrete (steps)	3 c. y.	50.00	35.00	45.00
21. Mortar rubble masonry	46 c. y.	20.00	12.00	28.00
22. High early strength std. gutter	173 l. f.	1.50	2.50	2.00
23. Radial conc. curb and gutter	94 l. f.	1.80	2.00	3.25
24. Plain conc. curb and gutter	4,250 l. f.	1.50	2.00	3.00
25. 8-in. h.e.s. conc. (entrances)	22 s. y.	3.00	4.00	5.00
26. 4-in. concrete sidewalk	200 s. y.	2.50	4.00	3.00
27. No. 9 stone (entrances)	87 ton	2.00	2.50	2.76
28. No. 13 stone	26,617 ton	1.50	2.50	1.76
29. 6-in. waterbound macadam	2,036 s. y.	1.00	.83	1.09
30. 8-in. waterbound macadam	678 s. y.	1.20	1.10	1.27
31. 9-in. waterbound macadam	307 s. y.	1.20	1.25	1.37
32. 10-in. waterbound macadam	9,756 s. y.	1.30	1.40	1.54
33. 10-in.-9-in.-10-in. waterbound macadam	81,867 s. y.	1.20	1.30	1.47
34. RT-4 or RT-5 bitum. material	31,614 gal.	.14	.16	.149
35. RT-5 or RT-6 bitum. material	1,118 gal.	.14	.16	.149
36. Covering material	67 ton	3.00	2.90	3.76
37. RT-5 to RT-11 bitum. material	92,607 gal.	.14	.16	.164
38. Covering material	4,630 ton	3.00	2.90	3.76
39. Topsoil	2,400 c. y.	1.50	1.50	1.25
40. Seeding	100,000 s. y.	.01	.05	.03

HIGHWAY SURFACING, UTAH

OWNER: Utah State Road Commission, Salt Lake City; John S. Evans, Chairman.

PROJECT: Plant-mixed bituminous surfacing 3.091 miles State Highway on 21st South Street between Main Street and Redwood Road, Salt Lake City, Salt Lake County, Utah. Plant-mixed surfacing is 2½-in. thick, and of variable width.

CONDITIONS: Contractor to furnish all materials and complete work in 170 working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.35 per hour; semi-skilled, 90c; and common labor, 75c per hour.

BIDS: Four bids were received December 31, 1942, ranging from the contract low of $280,912 to $452,429. Engineer's estimate, $376,126.

LIST OF BIDDERS:

1. Gibbons & Reed, Salt Lake City, Utah (contract)	$280,912
2. W. W. Clyde & Co., Springville, Utah	293,165
3. A. O. Thorn & Sons Constr. Co., Springville, Utah	381,815
4. Reynolds Ely Constr. Co., Springville, Utah	452,429

Item	Quan.	Unit Prices (1)	(2)
1. Bituminous mat'l., 200-300 penet.	97,000 gal.	$0.10	$0.10
2. Bituminous mat'l., Type RC-3	15,900 gal.	.13	.12
3. Bituminous mat'l., Type MC-1	31,800 gal.	.13	.12
4. Plant mixed bitum. surfacing	8,800 ton	3.00	2.25
5. Crushed rock or crushed gravel surface course	20,400 ton	.93	.92
6. Gravel or cr. rock base course	30,300 ton	.88	.90
7. Cover material	800 ton	2.75	3.00
8. Unclassified excavation	200,100 c. y.	.29	.25
9. Overhaul, Class A	1,375,000 sta. y.	.01	.015
10. Overhaul, Class B	497,300 yd. mi.	.10	.15
11. Rolling	3,000 hr.	5.50	3.50
12. Watering	3,604 M gal.	1.40	1.50
13. Channel excavation	9,000 c. y.	.35	.35
14. 15-in. concrete pipe	730 l. f.	2.15	2.25
15. 18-in. concrete pipe	186 l. f.	2.65	3.00
16. 30-in. concrete pipe	180 l. f.	4.75	5.25
17. 36-in. concrete pipe	772 l. f.	6.75	7.25
18. 48-in. concrete pipe	117 l. f.	9.50	10.00
19. Relay 12-in. corr. galv. metal pipe	76 l. f.	1.20	1.00
20. Relay 12-in. concrete pipe	106 l. f.	1.30	1.00
21. Relay 15-in. concrete pipe	34 l. f.	1.50	1.50
22. Relay 18-in. concrete pipe	101 l. f.	1.60	2.00
23. Excavation for structures	1,500 c. y.	1.40	1.50
24. Concrete, Class A	35 c. y.	45.00	35.00
25. Concrete, Class B	168 c. y.	40.00	30.00
26. Reinforcing steel	300 lb.	.10	.10
27. Untreated timber (Native Red Pine)	16.6 Mbm.	110.00	100.00
28. Waterproofing	220 s. y.	1.75	1.00
29. Concrete curb, No. 1-C	2,650 l. f.	1.00	1.00
30. Conc. curb and gutter, No. 3-F	110 l. f.	1.60	1.50
31. Conc. curb. and gutter, No. 3-H	3,550 l. f.	1.60	1.50
32. Conc. curb and gutter, No. 3-I	220 l. f.	1.60	2.00
33. Concrete sidewalk, 4-in. thick	1,300 s. y.	1.80	2.20
34. Concrete sidewalk, 6-in. thick	80 s. y.	2.75	3.30
35. Conc. driveway and driveway curb	640 l. f.	7.50	5.50
36. Removal of existing sidewalk	1,400 s. y.	.45	.30
37. Reconstruct cleanout boxes, manholes and monuments	10 ea.	15.00	100.00
38. Move fence	14,200 l. f.	.10	.10
39. Remove trees	253 ea.	15.00	25.00
40. Federal-Aid project markers	2 ea.	20.00	20.00

HIGHWAY, WEST VIRGINIA

OWNER: West Virginia State Road Comn., Charlesto W. Va.; C. H. Boggs, district engineer.

PROJECT: Improving of 3.086 miles of highway from 3 Street, St. Albans, W. Va., to Highlawn Underpass Road, a in Kanawha County. Includes grading, draining, concrete pav ment, and construction of bridge. Highway to be 44-ft. wid 4-lane, 8-in. uniform plain concrete pavement.

CONDITIONS: Contractor to furnish all materials and co plete work in 225 working days. Rail, highway, and wate transportation facilities available, but use of water transporta tion facilities is most likely. Wage rates are: skilled labo $1.35 per hr.; semi-skilled, $1.20; and common, 60c.

BIDS: Five bids were received March 31, 1942, ranging fro the contract low of $495,509 to $597,205.

LIST OF BIDDERS:

1. Keeley Constr. Co., Clarksburg, W. Va. (contract)	$495,50
2. Hatfield Constr. Co., Huntington, W. Va	554,18
3. Pinnell & Pfost, Ripley, W. Va.	594,56
4. Price Constr. Co., Huntington, W. Va	597,11
5. McHugh Bros., Springfield, Ohio, and Veceillio & Grogan, Beckley, W. Va	597,20

Item	Quan.	Unit Prices (1)	(2)
1. Clearing right-of-way	16,299 l. f.	$0.10	$0.04
2. Unclassified excavation	82,500 c. y.	.50	.60
3. Borrow	56,700 c. y.	.35	.50
4. Rock borrow	95,700 c. y.	1.15	1.40
5. Overhaul	2,300,000 st. yd.	.0075	.005
6. Structure excavation	2,170 c. y.	2.00	3.00
7. Concrete pavement, 8-in. uniform	86,890 s. y.	2.50	2.72
8. ½-in. longitudinal joint	6,730 l. f.	.15	.12
9. ¾-in. transverse expan. joint	6,400 l. f.	.20	.16
10. 24-in. plain concrete pipe	520 l. f.	2.75	3.00
11. 18-in. rein. conc. pipe	2,360 l. f.	2.50	2.50
12. 24-in. rein. conc. pipe	160 l. f.	3.50	4.00
13. 36-in. rein. conc. pipe	205 l. f.	6.00	8.00
14. Class A concrete	527 c. y.	26.00	28.00
15. Class B concrete	317 c. y.	24.00	27.00
16. Riprap	100 c. y.	6.00	4.00
17. Reinforcing steel	63,220 lb.	.07	.08
18. Dowel bars	36,470 lb.	.07	.08
19. Sidewalk inlets	14 ea.	100.00	80.00
20. Manhole frames and covers	4 ea.	40.00	30.00
21. 6-in. concrete curb	29,340 l. f.	1.00	1.00
22. 6-in. integral curb	2,600 l. f.	.70	.70
23. Concrete sidewalks	580 s. f.	.35	.40
24. Creosoted timber piling	6,300 l. f.	1.50	1.60
25. Waterproofing	755 s. y.	1.25	1.30
26. Manholes, except castings	4 ea.	75.00	100.00

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WE SAW STABILIZATION COSTS CUT IN HALF THIS YEAR!

Compacting Part of Area While Mixing Operation Continues in Soil-Cement Stabilization.

RALPH W. REID *(left)*
GLENN P. HOLCOMB *(right)*

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"... we have been greatly interested in the exceptional performance of the SEAMAN PULVI-MIXERS which are operating on a large soil-cement job in this State. Our observation has been that the work has been done not only at a great saving in time, but that a better and more thorough mixture of soil and cement has been obtained. The excellent control of moisture in the process due to the SEAMAN PULVI-MIXER has been an outstanding factor.

We would say that the SEAMAN PULVI-MIXER has cut operating costs 50% as compared with the cost of other equipment that has been used for such work in the past ..."

Cut costs 50% — and did a faster, better and more thorough job! That's why highway engineers, contractors and the armed forces pick the SEAMAN MIXER wherever there's a job of soil-stabilization to be done.

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Waukesha
SOIL STABILIZATION METHODS

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SEAMAN MOTORS
MILWAUKEE WISCONSIN

HIGHWAY IMPROVEMENTS, NORTH DAKOTA

OWNER: North Dakota State Highway Department, Bismarck.

PROJECT: Improvement of U. S. Highway No. 2, from Church's Ferry to Devils Lake, in Benson and Ramsey Counties, North Dakota. Includes almost 800,000 cubic yards of excavation in connection with the grading of the project. Also involves the furnishing and laying of concrete pipe culverts ranging from 15-in. to 48-in. in diameter.

CONDITIONS: Contractor to furnish all materials and complete work in 150 sixteen-hour working days. Uncertainty as to availability of labor and materials may add to cost, as work on project is not to start until spring. Wage rates specified are: skilled labor, $1.30 per hour; semi-skilled, 70c. to $1.00; and common labor, 50c.

LIST OF BIDDERS: (Opening of November 20, 1942.)

1. Archie Campbell, Warwick, N. D. (contract)	$269,715
2. Bismarck Constr. Co., Bismarck, N. D	275,696
3. W. H. Noel Co., Jamestown, N. D	455,328

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation	795,732 c.y.	$0.185	$0.19	$0.30
2. Imported borrow	55,365 c.y.	.30	.30	.35
3. Water for extra compaction of embankments	15,351 M gal.	.50	.50	2.00
4. Obliteration of old roads	800 l.f.	.20	.12	.25
5. Seeding, type C	288.58 ac.	20.00	12.00	10.00
6. Gravel sub-base	66,900 ton	1.00	1.00	2.00
7. Relaying pipe, all sizes	50 l. f.	1.00	1.00	1.00
8. 15-in. plain conc. pipe culverts	22 l. f.	2.00	2.25	2.13
9. 18-in. plain conc. pipe culverts	2,798 l. f.	2.50	2.75	2.75
10. 21-in. plain conc. pipe culverts	1,196 l. f.	3.00	3.50	3.83
11. 24-in. plain conc. pipe culverts	1,048 l. f.	3.50	4.00	4.27
12 30-in. plain conc. pipe culverts	618 l. f.	4.50	6.00	5.62
13. 36-in. plain conc. pipe culverts	682 l. f.	6.00	7.00	6.93
14. 42-in. plain conc. pipe culverts	360 l. f.	7.00	9.50	8.49
15. 48-in. plain conc. pipe culverts	126 l. f.	10.00	11.50	10.00
16. 50-in. reflector crossing signs	2 ea.	150.00	75.00	50.00

HIGHWAY, PENNSYLVANIA

OWNER: Pennsylvania State Highway Dept., Harrisburg. T. C. Frame, chief engr.

PROJECT: Concrete and relaid brick paving 17,497 feet of Traffic Route 930 in Aliquippa and Monaca Boros, and Hopewell and Center Townships, Beaver County, Pa. Involves construction of approximately 17,487 feet of cement concrete paving 33 feet and varying in width; 10 linear feet of relaid brick pavement, varying in width; clearing and grubbing; excavation; drainage structures; curbing; and retaining wall.

CONDITIONS: Contractor to furnish all materials except salvaged structural steel for retaining wall, and complete project in 290 calendar days. Rail and highway transportation facilities available. Wage rates specified are: skilled labor, 75c. per hour; semi-skilled 55c.; and common, 50c.

BIDS: Four bids were received January 22, 1943, ranging from the low of $1,018.969 to $1,544,571.

LIST OF BIDDERS:

1. S. J. Groves & Sons Co., Ridgefield, N. J. (low bidder)	$1,018,969
2. Bero Engr. & Constr. Corp., Buffalo, N. Y	1,392,377
3. Ralph Myers Constr. Co., Salem, Ind	1,405,800
4. Dinardo, Inc., Pittsburgh, Pa	1,544,571

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	Lump Sum	$20,000.00	$10,000.00	$23,000.00
2. Class I excavation	844,395 c. y.	.77	1.20	1.21
3. Class II excavation	4,692 c. y.	3.00	2.50	3.25
4. Subgrade	70,958 s. y.	.20	.20	.15
5. Shoulders	14,045 l. f.	.25	.25	.32
6. Natural stone, type B; or crushed aggr. base course, 6-in	4,539 s. y.	1.25	1.60	1.90
7. As above, 8-in. depth	1,998 s. y.	1.75	1.95	2.10
8. Selected material, surfacing	645 c. y.	3.00	6.50	1.70
9. Reconditioned base course mat'l	8 c. y.	7.00	4.50	3.00
10. Cement conc. base crse., type A, for pipe trench replacement	3 c. y.	30.00	18.00	35.00
11. Plain cem. conc. base crse., type A, 8-in. depth	75 s. y.	3.30	3.20	3.
12. Plain cem. conc. pavmt., 6-in. depth	28 s. y.	3.00	3.10	2.
13. Cem. concrete pavmt., 9-in. depth.	64,318 s. y.	3.10	3.30	2.
14. Relay block pavement	83 s. y.	3.00	3.50	3.
15. Bitum. surface crse., AT-1	5,309 s. y.	.70	.60	1.
16. Bitum. surface crse., CP-2, 2-in. depth	1,075 s. y.	.95	1.10	1.
17. Class B concrete	455 c. y.	30.00	35.00	40.
18. Plain steel bars	120 lb.	.12	.10	
19. Stone backfill for misc. drainage	4 c. y.	8.00	4.50	15.
20. Stone backfill for structures	30 c. y.	8.00	4.50	3.
21. Cement rubble masonry	22 c. y.	22.00	25.00	25.
22. Type A tree walls	22 c. y.	20.00	40.00	40.
23. Plain stone slope wall	22 c. y.	18.00	25.00	25.
24. Grouted rubble paving, stream beds, 6-in. thick	9 c. y.	20.00	35.00	25.
25. Manhole	1 ea.	250.00	200.00	160.
26. Type E inlet with curtain walls	1 ea.	250.00	150.00	135.
27. Type E inlets	3 ea.	175.00	150.00	105.
28. Double E inlet	1 ea.	300.00	200.00	170.
29. City of Pittsburgh storm inlet, type 5	2 ea.	300.00	250.00	180.
30. Reset manhole castings	1 set	75.00	50.00	15.
31. 15-in. rein. concrete pipe	2,204 l. f.	3.25	3.00	3.7
32. 18-in. rein. concrete pipe	1,762 l. f.	4.00	3.75	4.5
33. 24-in. rein. concrete pipe	350 l. f.	5.50	4.50	5.5
34. 42-in. rein. concrete pipe	166 l. f.	14.00	12.00	17.
35. 24-in. vertical rein. conc. pipe	84 l. f.	50.00	5.50	12.
36. 15-in. plain cem. conc. or vitr. clay pipe	246 l. f.	3.25	2.75	3.
37. 18-in. as above	204 l. f.	3.50	3.50	4.5
38. Relay 15-in. rein. conc. pipe	32 l. f.	3.00	2.50	4.00
39. Relay 18-in. rein. conc. pipe	74 l. f.	4.00	2.50	4.75
40. Relay 24-in. rein. conc. pipe	20 l. f.	5.00	3.00	5.00
41. Relay 18-in. corr. metal pipe	39 l. f.	4.00	3.00	4.50
42. 6-in. tile underdrain	13,680 l. f.	1.15	1.15	1.35
43. 6-in. T. F. underdrain, type B	9,954 l. f.	1.15	1.00	1.35
44. 6-in. tile outlets	2,361 l. f.	.80	.90	1.15
45. 8-in. tile outlets	170 l. f.	1.00	1.00	1.35
46. Coarse aggregate for ext. depth tile underdrain	265 c. y.	3.25	4.00	4.00
47. Subgrade drains	4,090 l. f.	.65	.50	.50
48. Plain rubble gutter	295 s. y.	4.00	5.00	6.00
49. Grouted rubble gutter (seg.)	230 s. y.	4.50	8.50	8.00
50. Plain cem. concrete gutter	4,385 s. y.	3.25	4.50	4.00
51. Plain cem. conc. curb, type A	320 l. f.	1.75	2.00	2.00
52. Guard posts	1,283 ea.	3.00	6.00	6.25
53. Treated lumber; wooden floors, etc.	23.3 Mbm.	200.00	225.00	235.00
54. Place salvaged struct. steel in retaining wall	Lump Sum	500.00	150.00	500.00

HIGHWAY, TENNESSEE

OWNER: Tennessee Department of Highways and Public Works, Nashville, Tenn.

PROJECT: Improvement of 6.988 miles of highway in Henry County, between Paris and Routon, Tenn. Includes all necessary roadway, drainage, borrow and culvert excavation; concrete pavement, both 8-6-8-6-8-in. and 7-in. uniform; curbing; gutters; sidewalk; railroad crossing section; culvert extensions; and side drain and sewer pipe. Roadway width 22-ft.

CONDITIONS: Contractor to furnish all materials and complete work in 100 working days. Rail and highway transportation facilities available near site of work. There are high fills and deep cuts involves in construction of this heavily traveled access road. Wage rates are: skilled labor, 75c. per hr.; semi-skilled, 45c.; and unskilled, 30c.

BIDS: Five bids were opened May 1, 1942, ranging from the contract low of $314,716 to $325,702.

LIST OF BIDDERS:

1. F. C. Gorrell & Sons, Russellville, Ky. (contract)	$314,716
2. Bowyer & Johnson, Jackson, Tenn	318,872
3. Lehman-Roberts Co., Memphis, Tenn	318,994
4. Ziegler Constr. Co., Nashville, Tenn	321,064
5. Foster-Creighton Co., Nashville, Tenn.	325,702

Item	Quan.	Unit Prices (1	(2	(3
1. Rdwy. and drainage excav. (uncl.)	10,150 c. y.	$0.48	$0.40	$0.40
2. Borrow excavation (unclassified)	34,100 c. y.	.48	.50	.40
3. Culvert excavation (unclass.)	2,661 c. y.	2.25	1.50	1.50
4. Sodding	89,905 s. y.	.36	.40	.35
5. Cem. conc. pavmt. (plain) 8-6-8-6-8-in.	93,529 s. y.	2.28	2.37	2.46
6. Cem. conc. pavmt. (plain) 7-in.	4,525 s. y.	2.60	2.47	2.51
7. Cement conc. raised edge	23,775 l. f.	.10	10	.10
8. Treated timber	4.893 Mbm.	200.00	175.00	150.00
9. Class A concrete	207.9 c. y.	35.00	25.00	20.00
10. Class B concrete	139.49 c. y.	32.00	30.00	20.00
11. Brick masonry	0.553 M	100.00	75.00	50.00
12. Concrete sidewalk	262 s. f.	.40	.30	.30
13. Concrete curb	12.2 c. y.	30.00	30.00	22.00
14 Conc. combined curb and gutter	8.1 c. y.	30.00	25.00	22.00
15. Railroad crossing section	48 s. y.	6.00	9.00	4.00
16. 18-in. conc. pipe culvert (exten.)	38 l. f.	3.00	2.50	1.75
17. 30-in. conc. pipe culvert (exten.)	42 l. f.	6.25	5.00	4.50
18. 15-in. conc. sewer pipe (non-rein.)	612 l. f.	1.50	1.30	1.10
19. 18-in. conc. sewer pipe (non-rein.)	6,332 l. f.	2.00	1.60	2.00

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HEAVY-DUTY CONSTRUCTION EQUIPMENT

HIGHWAY, WISCONSIN

OWNER: State Highway Comn. of Wisconsin, Madison; D. J. Minahan, division engineer.

PROJECT: Grading and construction of 7.41 miles of 20-ft. concrete pavement on U. S. Highway No. 12, about four miles north of Prairie du Sac. (Contract No. 2).

CONDITIONS: Contractor to furnish all materials and complete work in 125 working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, 85c. to $1.50 per hr.; semi-skilled, 65c. to $1.50; and common, 65c. to $1.00.

BIDS: Three bids were received April 17, 1942, ranging from the contract low of $540,231 to $560,265.

LIST OF BIDDERS:

1. N. M. Isabella, Madison, Wis. (contract)	$540,231
2. L. G. Arnold, Inc., Eau Claire, Wis	542,624
3. J. R. Griffith Co., Racine, Wis	560,265

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing	104 sta.	$20.00	$20.00	$18.00
2. Grubbing	89 sta.	25.00	20.00	20.00
3. Remove concrete pavement	7,650 s. y.	.35	.30	.35
4. Unclassified excavation	127,267 c. y.	.57	.43	.48
5. Unclassified excavation	87,234 c. y.	.57	.88	1.15
6. Excavation, structures	260 c. y.	3.00	2.00	2.00
7. Borrow excavation	37,844 c. y.	.57	.54	.55
8. Finishing roadway	405 sta.	20.00	15.00	15.00
9. Obliterate old road	12 sta.	10.00	15.00	8.00
10. Concrete pavement	38,623 s. y.	2.68	2.54	2.40
11. Concrete surface drains	29 c. y.	40.00	25.00	15.00
12. Gravel or cr. stone, traf. bound surf. course	13,299 c. y.	1.50	1.50	1.45
13. Aggregate for gravel or cr. stone traf. bd. surf. crse in stockpiles	1,495 c. y.	1.50	1.45	1.40
14. Salvage surface course	5,400 s. y.	.09	.15	.16
15. Conc. masonry culvert	243 c. y.	25.00	28.00	28.00
16. Treated lumber and timber	2.3 Mbm.	175.00	185.00	150.00
17. Dry rubble masonry	482 c. y.	7.00	8.00	7.50
18. 24-in. rein. conc. culv. pipe	1,355 l. f.	3.75	4.00	3.75
19. 30-in. rein. conc. culv. pipe	127 l. f.	5.00	5.00	5.00
20. 36-in. rein. conc. culv. pipe	123 l. f.	6.40	6.00	6.50
21. 42-in. rein. conc. culv. pipe	239 l. f.	7.50	9.50	10.70
22. 48-in. rein. conc. culv. pipe	165 l. f.	9.20	10.50	11.00
23. Salvage 18-in. corr. galv. sheet metal culv. pipe	226 l. f.	1.25	1.00	1.25
24. Salv. 24-in. corr. galv. sheetmet. culv. pipe	290 l. f.	2.00	1.25	1.50
25. Temp. crossing (Sta. 172C + 30)	L.S.	350.00	400.00	225.00
26. Temp. crossing (Sta. 238 + 67)	L.S.	350.00	500.00	225.00
27. Temp. crossing (Sta. 277 + 00)	L.S.	350.00	500.00	225.00
28. Temp. crossing (Sta. 315 + 00)	L.S.	350.00	500.00	225.00
29. Temp. crossing (Sta. 355 + 00)	L.S.	350.00	500.00	225.00
30. Temp. crossing (Sta. 395 + 65)	L.S.	350.00	500.00	225.00
31. Grouted rubble paving	80 s. y.	2.50	3.50	4.50
32. 12-in. rein. conc. culv. pipe, storm sewers	63 l. f.	2.50	3.00	3.00
33. Inlets, type A for 18-in. curb and gutter	2 ea.	55.00	50.00	35.00
34. Special curb and gutter	1,238 l. f.	2.10	2.10	2.00
35. Marker posts	121 ea.	2.50	2.25	2.00
36. Marker posts for rt.-of-way	109 ea.	2.50	2.25	2.00
37. Topsoil for seed beds and sodding	19,217 s. y.	.19	.15	.16
38. Salvage topsoil	32,047 s. y.	.16	.10	.10
39. Fertilizer	660 cwt.	3.50	5.00	5.00
40. Seeding	366,000 s. y.	.012	.015	.015
41. Sodding	19,217 s. y.	.32	.45	.40
42. Intercepting embankment	4,013 l. f.	.20	.75	.75
43. 18-in. culvert pipe	210 l. f.	1.75	2.50	2.00
44. 24-in. culvert pipe	136 l. f.	2.60	3.50	3.00
45. 30-in. culvert pipe	150 l. f.	3.00	4.60	4.00
46. Scale resistant concrete pavmt	57,063 s. y.	2.68	2.65	2.50
47. HES scale resistant conc. pavmt	14,457 s. y.	2.89	2.70	3.10
48. White conc. reflecting curb and gutter	3,084 l. f.	2.75	2.75	2.50

HIGHWAY, WISCONSIN

OWNER: Wisconsin State Highway Commission, Madison.

PROJECT: Improving 4.39 miles of State Route 60 and U. S. Highway 12, west and north of Sauk City, Sauk County, Wis. Includes grading, and 20-ft. portland cement concrete pavement.

CONDITIONS: Contractor to furnish all materials and complete work in 100 working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, 85c. to $1.50 per hr.; semi-skilled, 65c. to $1.50; and common, 65c. to $1.00. Roadway to relieve congestion of traffic caused by new plant in area.

BIDS: Four bids were opened April 17, 1942, ranging from the contract low of $177,423 to $210,812.

LIST OF BIDDERS:

1. Streu Construction Co., Two Rivers, Wis. (contract)	$17
2. James Cape & Sons Co., Racine, Wis	19
3. Koch Constr. Co., Milwaukee, Wis	19
4. L. G. Arnold, Inc., Two Rivers, Wis	21

Item	Quan.	Unit Prices (1)	(2)
1. Clearing	72 sta.	$5.00	$22.00
2. Grubbing	70 sta.	5.00	22.00
3. Remove conc. pavement	4,483 s.y.	.25	.40
4. Remove curb and gutter	590 l.f.	.25	.15
5. Remove conc. sidewalks	84 s.y.	.30	.50
6. Remove inlets	4 ea.	15.00	25.00
7. Unclassified excavation	85,670 c.y.	.26	.39
8. Excavation for structures	180 c.y.	1.00	1.50
9. Finishing roadway	263 sta.	10.00	16.00
10. Concrete pavement	43,429 s.y.	2.10	2.10
11. Widening concrete pavmt	1,718 s.y.	2.35	2.35
12. Concrete headers	11 s.y.	3.00	4.00
13. Gravel or crushed stone surf. crse	7,469 c.y.	1.20	1.25
14. Aggr. for gravel or cr. stone traffic bound surf. crse (stockpiles)	870 c.y.	1.20	1.15
15. Salvage surface, base course	52,366 s.y.	.07	.09
16. Concrete masonry, culverts	108 c.y.	22.00	26.00
17. Dry rubble masonry	301 c.y.	10.00	8.00
18. Rein. conc. culvert pipe, 24-in	505 l.f.	3.35	3.40
19. Rein. conc. culvert pipe, 36-in	94 l.f.	5.65	6.05
20. Rein. conc. culvert pipe, 42-in	132 l.f.	7.00	8.00
21. Rein. conc. culvert pipe, 48-in	85 l.f.	8.25	9.60
22. Temporary crossing (Sta. 47 + 94)	L.S.	300.00	200.00
23. Temporary crossing (Sta. 135 + 29)	L.S.	300.00	200.00
24. Temporary crossing (Sta. 176 + 44)	L.S.	300.00	200.00
25. Grouted rubble paving	35 s.y.	1.90	3.00
26. Rein. conc. culv. pipe, storm sew., 12-in.	113 l.f.	1.75	2.50
27. Catch basin, type A	1 ea.	175.00	250.00
28. Catch basin, type B	1 ea.	40.00	85.00
29. Inlets, type A	3 ea.	40.00	50.00
30. Inlets, type B	1 ea.	25.00	40.00
31. Manhole cover	1 ea.	20.00	45.00
32. Adjust manhole cover	10 ea.	20.00	15.00
33. Conc. combin. curb and gutter, 30-in	590 l.f.	1.00	1.20
34. Conc. sidewalks, 5-in	490 s.f.	.22	.25
35. Marker posts	46 ea.	2.00	2.50
36. Marker posts, rt.-of-way	98 ea.	2.00	2.50
37. Topsoil seedbeds, sod	3,293 s.y.	.09	.09
38. Salvage topsoil	43,000 s.y.	.10	.06
39. Fertilizer	389 cwt.	2.75	3.50
40. Seeding	212,190 s.y.	.015	.012
41. Sodding	3,293 s.y.	.40	.50
42. Intercept. embankment	900 l.f.	.40	.15
43. 18-in. culvert pipe	1,020 l.f.	1.60	1.80
44. 24-in. culvert pipe	40 l.f.	2.25	2.80
45. 30-in. culvert pipe	56 l.f.	2.70	3.50
46. 36-in. culvert pipe	40 l.f.	3.20	4.85
47. Scale resisting concrete pavmt	8,019 s.y.	2.10	2.15

HIGHWAY, TEXAS

OWNER: Texas State Highway Commission, Austin; D. Greer, state highway engineer.

PROJECT: Grading, structures, and concrete paving 12.68 miles of U. S. Highway 271 and State Route 135 in Smith Gregg and Wood Counties, Texas. Project runs from Mineol to 0.6 miles east of the Van Zandt County line, and fro 4.2 miles southwest of the Gregg County line to Gladewater.

CONDITIONS: Contractor to furnish all materials. Rail and highway transportation facilities available. Prevailing wages to be paid.

BIDS: Four bids were received December 15, 1942, ranging from the low of $476,252 to $514,183.

LIST OF BIDDERS:

1. L. H. Lacy Co., Dallas, Tex. (low bidder)	$476,252
2. Harrison Engr. & Constr. Corp., Kansas City, Mo.	479,731
3. Texas Bitulithic Co., Dallas, Tex.	501,666
4. Standard Paving Co., Fort Worth, Tex.	514,183

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Common and special road excav	74,776 c. y.	$0.30	$0.39	$0.35
2. Common and special borrow	3,183 c. y.	.42	.39	.35
3. Common and spec. channel excav	1,046 c. y.	.42	.50	45
4. Unclassified structural excav	184 c. y.	2.50	2.00	2.50
5. Blading embankment	219 hr.	4.75	4.00	6.00
6. Overhaul	18,549 ¼-mi. y.	.12	.10	.10
7. Sprinkling	4,094 M gal.	1.50	1.00	1.50
8. Rolling	151 hr.	6.00	5.00	5.50
9. Salvage and replace flexible base	5,480 c. y.	1.60	1.00	1.70
10. Flexible base	6,946 c. y.	1.10	.80	1.30
11. Add'l. quarter-mile haul	222,332 c. y.	.033	.03	.033
12. Concrete pavement	180,186 s. y.	2.23	2.27	2.35
13. Class A concrete	284.61 c. y.	42.00	33.00	35.00
14. Reinforcing steel	9,380 lb.	.063	.10	.10
15. 12-in. plain conc. culv. pipe	128 l. f.	1.22	2.00	1.50
16. 24-in. plain conc. culv. pipe	226 l. f.	2.60	3.00	2.80
17. Remove old structures (culv.)	6 ea.	147.00	50.00	40.00
18. Remove old structures (bridges)	1 ea.	415.00	300.00	330.00
19. Monolithic concrete curb	440 l. f.	.42	1.00	1.00
20. Concrete curb and gutter	480 l. f.	1.90	2.50	3.00
21. Right-of-way markers	8 ea.	2.40	2.00	1.00

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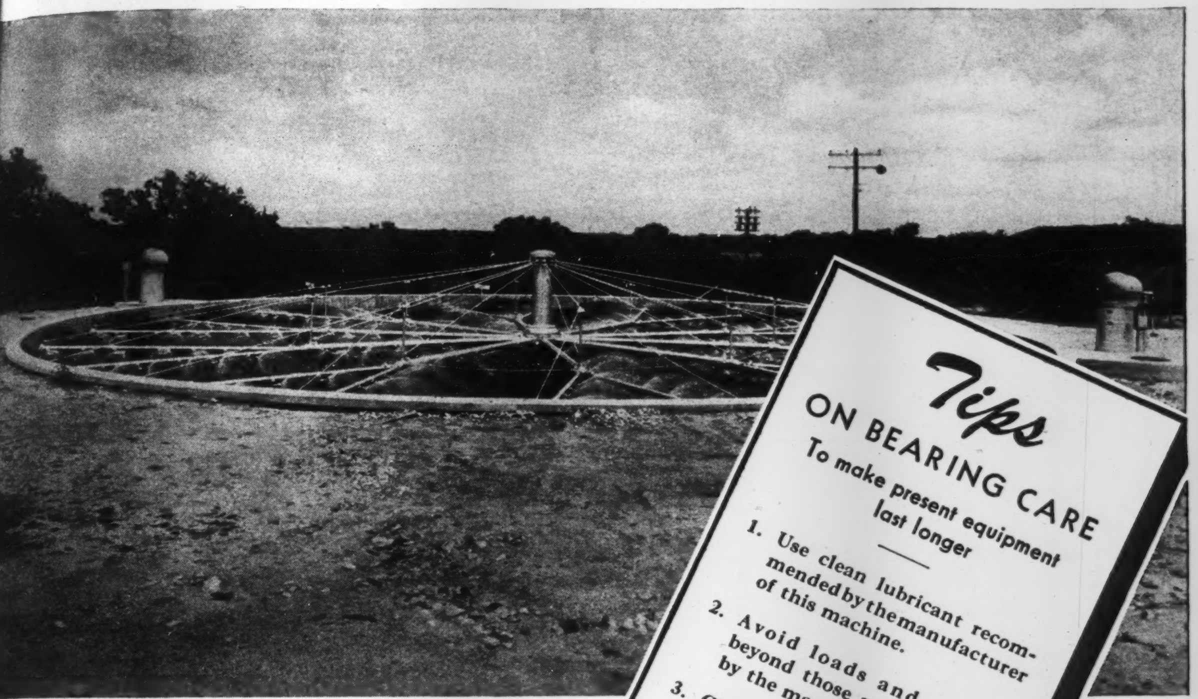

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2. Avoid loads and speeds beyond those recommended by the manufacturer.
3. Check wiring and insulation frequently. Short circuits or stray currents can damage bearings.
4. If necessary to remove bearings, keep them properly lubricated. Avoid the intrusion of water and dirt. Apply pressure on the inner race only. Don't hammer outer race.

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BALL AND ROLLER
BEARINGS

ARMY E NAVY

SKF INDUSTRIES, INC., PHILA., PA.

HIGHWAY IMPROVEMENT, NORTH CAROLINA

OWNER: North Carolina State Highway and Public Works Commission, Raleigh. W. V. Baise, State Highway Engineer.

PROJECT: Grading, soil type base course, and sand asphalt surfacing 3.42 miles of roadway from a point on U. S. Highways 74 and 76, 685 ft. north of Bradley's Creek Bridge, to U. S. Highway 17 in New Hanover County, N. C. Includes all necessary excavation, overhaul, base course, surfacing, drainage structures, fencing, right-of-way markers, and creosoted structural timber for completion of project.

CONDITIONS: Contractor to furnish all materials and complete job in 100 working days. Rail and highway transportation facilities available. Minimum wage rates are: skilled labor, 55c. per hour; semi-skilled, 35c.; and common labor, 30c.

LIST OF BIDDERS: (Bids received October 14, 1942)

1. F. D. Cline, Raleigh, N. C. (low bidder)	$121,933
2. J. P. McGuire Constr. Co., Durham, N. C.	140,497

Item	Quan.	Unit Prices (1)	(2)
1. Clearing	50 ac.	$200.00	$250.00
2. Grubbing	42 ac.	200.00	200.00
3. Unclassified excavation	46,800 c. y.	.48	.55
4. Drainage ditches	1,400 c. y.	.95	1.00
5. Borrow excavation	24,800 c. y.	.55	.60
6. Overhaul, special (one-half mile)	40,000 c. y.	.06	.06
7. Topsoil shoulders (select. mat'l)	1,600 c. y.	1.00	1.00
8. Soil type base course	11,800 c. y.	.90	.95
9. Sand asphalt base course, 2-in.	45,900 s. y.	.60	.75
10. Sand asphalt surface course, 1-in.	45,900 s. y.	.32	.40
11. Class C concrete, headwalls	15 c. y.	25.00	30.00
12. 30-in. reinforced concrete pipe	80 l. f.	8.00	7.00
13. 36-in. reinforced concrete pipe	132 l. f.	11.00	10.00
14. 42-in. reinforced concrete pipe	60 l. f.	15.00	14.50
15. 15-in. plain concrete pipe	16 l. f.	2.00	2.25
16. 18-in. plain concrete pipe	388 l. f.	3.50	3.50
17. 24-in. plain concrete pipe	208 l. f.	5.00	4.50
18. Relaid pipe, 18-in. or less	25 l. f.	2.00	1.50
19. Relaid pipe, more than 18-in.	25 l. f.	4.00	3.00
20. Shoulder drains	70 c. y.	6.50	6.00
21. Reset comb. barb- and hog-wire fence	500 l. f.	.05	.05
22. Right-of-way markers	48 ea.	3.00	3.00
23 Creosoted structural timber	13.4 M bm.	200.00	250.00

HIGHWAY, NEBRASKA

OWNER: Nebraska Department of Roads and Irrigation, Lincoln. W. G. Scott, State Highway Engineer.

PROJECT: Construction of 5.7 miles of concrete pavement in connection with road improvement in Lancaster County, Nebr. Involves necessary grading, removal of old structures, approximately 112,000 square yards of concrete paving, curbing, sidewalks, concrete and brick driveways, culverts, sewers, and roadside improvement. Alternates were allowed for the sewer pipe, either vitrified clay or cement concrete. Both bidders submitted their bids on the latter basis.

CONDITIONS: Contractor to furnish all materials. Rail and highway transportation facilities available. Wage rates specified are: skilled labor, $1.25 per hour; semi-skilled, 85c.; and common labor, 50c.

BIDS: Two bids were received September 3, 1942, the contract low of $545,358, and $634,606.

LIST OF BIDDERS:

1. Abel Constr. Co., and Dobson & Robinson, Lincoln, Nebr. (contract)	$545,358
2. Inland Construction Co., Omaha, Nebr.	634,606

Item	Quan.	Unit Prices (1)	(2)
1. Clearing and grubbing	Lump Sum	$224.85	$224.85
2. Excavation	272,520 c. y.	.31	.40
3. Water, applied	5,252 M gal.	2.00	2.00
4. Concrete protection work	270 s. y.	3.00	2.20
5. Relay rein. conc. pipe, drives	40 l. f.	1.00	1.00
6. Relay corrugated metal pipe, drives	144 l. f.	.75	1.00
7. Remove old structures	38 ea.	10.00	50.00
8. Remove old structure, Sta. 22	1 ea.	10.00	25.00
9. Remove old structures, Sta. 198, 218 and 232	3 ea.	10.00	25.00
10. Remove old structures, Sta. 236 and 258	2 ea.	25.00	25.00
11. Remove old structure, Sta. 237	1 ea.	25.00	25.00
12. Remove old structures Sta. 238 242 and 260	3 ea.	10.00	[illegible]
13. Remove old structure, Sta. 242	1 ea.	25.00	[illegible]
14. Concrete pavement, Class C, E, or F conc.	112,277 s. y.	2.87	[illegible]
15. Comb. conc. curb and gutter	2,675 l. f.	1.25	[illegible]
16. Precast concrete curb	3,956 l. f.	1.00	[illegible]
17. Island curb	2,786 l. f.	.30	[illegible]
18. Concrete sidewalks	1,280 s. f.	.18	[illegible]
19. Concrete driveways	82 s. y.	2.30	[illegible]
20. Brick driveways	186 s. y.	1.90	[illegible]
21. Relay precast concrete walks	2,576 s. f.	.13	[illegible]
22. Concrete, headers	1.2 c. y.	15.00	[illegible]
23. Remove old headers	8 ea.	8.50	[illegible]
24. Remove concrete pavement	299 s. y.	.65	[illegible]
25. Remove brick surface course	45,438 s. y.	.75	[illegible]
26. Remove concrete base course	36,137 s. y.	.40	[illegible]
27. Remove concrete driveways	84 s. y.	.50	[illegible]
28. Remove comb. conc. curb and gutter	284 l. f.	.25	[illegible]
29. Remove concrete curb	31 l. f.	.20	[illegible]
30. Remove walks	2,923 s. f.	.05	[illegible]
31. Excavation for culverts	2,510 c. y.	2.10	[illegible]
32. Excavation, for sewers	1,605 c. y.	2.10	[illegible]
33. Excav. for catch basins and inlets	150 c. y.	2.10	[illegible]
34. Class A, C or H concrete, culv. and headwalls	870.37 c. y.	36.50	[illegible]
35. Cl. A, C or H conc., catch basins and inlets	12.66 c. y.	50.00	[illegible]
36. Reinforcing steel, catch basins and inlets	160 lb.	.10	[illegible]
37. Relay reinforced concrete pipe	110 l. f.	1.50	[illegible]
38. Relay concrete sewer pipe	102 l. f.	1.50	[illegible]
39. Relay vitr. clay pipe	95 l. f.	1.50	[illegible]
40. Untreated timber	0.863 Mbm.	150.00	[illegible]
41. Treated timber	6.637 Mbm.	200.00	[illegible]
42. Treated timber posts	200 l. f.	1.00	[illegible]
43. Cl. A, C or H concrete, elbows	7.34 c. y.	50.00	[illegible]
44. Cast steel grates	650 lb.	.25	[illegible]
45. Steel checker plate curb inlet covers	448 lb.	.25	[illegible]
46. Treated timber covers, inlets and junction boxes.	0.389 Mbm.	200.00	250.00
47. Remove old structure, Sta. 25	1 ea.	75.00	100.00
48. Remove old structure, Sta. 71	1 ea.	300.00	200.00
49. Remove old structure, Sta. 78 Lt.	1 ea.	25.00	35.00
50. Remove old structure, Sta. 78 Rt.	1 ea.	25.00	30.00
51. Remove old structure, Sta. 78+59 Rt.	1 ea.	25.00	30.00
52. Remove old structure, Sta. 127	1 ea.	125.00	100.00
53. Remove old structure, Sta. 145	1ea.	200.00	150.00
54. Remove old structure, Sta. 156	1 ea.	150.00	175.00
55. Remove old structure, Sta. 246	1 ea.	175.00	150.00
56. Remove old headwalls, pipe	25 ea.	15.00	25.00
57. Remove old endwalls, culverts	6 ea.	75.00	100.00
58. 12-in. culvert pipe	244 l. f.	1.60	1.75
59. 18-in. culvert pipe	1,232 l. f.	2.30	2.50
60. 24-in. culvert pipe	412 l. f.	3.55	3.40
61. 30-in. culvert pipe	408 l. f.	4.75	4.60
62. 36-in. culvert pipe	188 l. f.	6.00	5.50
63. 48-in. culvert pipe	88 l. f.	10.00	9.50
64. 12-in. cem. conc. sewer pipe	160 l. f.	1.40	1.50
65. 18-in. cem. conc. sewer pipe	136 l. f.	2.20	2.50
66. 24-in. cem. conc. sewer pipe	780 l. f.	3.20	3.50
67. Seeding, Type A	41.1 ac.	35.00	40.00
68. Seeding, Type B	4.3 ac.	60.00	75.00
69. Mulching	20,592 s. y.	.06	.10
70. Mulch covering	286 c.y.	4.50	4.00
71. Sodding	11,884 s. y.	.50	.60

HIGHWAYS AND BRIDGES OKLAHOMA

OWNER: Oklahoma State Highway Comm., Oklahoma City.

PROJECT: Grading, drainage, concrete paving, and construction of five reinforced concrete bridges in Oklahoma County, Okla. Pavement is of four-lane width, each lane 22-ft. Total length of project including approaches is 6.121 miles.

CONDITIONS: Contractor to furnish all materials and complete work in 200 working days. Rail and highway transportation facilities available to site of work. Material and labor shortages are expected to appear before completion of project, as it is difficult to obtain low preference rating for this type of construction. Wage rates are: skilled labor, $1.00 per hr.; semi-skilled, 60c.; common, 40c.

LIST OF BIDDERS: (Awarded June 2, 1942)

1. Moran & Buckner, Muskogee, Okla. (contract)	$582,567
2. Ryan-Beekman, Oklahoma City, Okla.	592,345
3. J. Briscoe, Stillwater, Okla.	594,881

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Class D excavation, unclassified	133,617 c. y.	$0.27	$0.30	$0.28
2. Rolling	1,745 hr.	1.65	1.50	1.65
3. Sprinkling	3,273 M gal.	.80	1.00	1.00
4. Overhaul	76,480 sec. y.	.033	.04	.40
5. Shoulders	6.209 mi.	325.00	300.00	300.00
6. 4-in. gravel base course	2,273 s. y.	.50	.40	.60
7. Rolling base course	16 hr.	1.50	1.50	1.65
8. Sprinkling base course	44.5 M gal.	1.00	1.00	1.00
9. Prime material	796 gal.	.12	.10	.11
10. Plain cement conc. pavmt. (9-6-9-in.)	135,292.8 s. y.	2.02	2.03	2.10
11. Approach slab	228.05 s. y.	4.50	4.50	4.50
12. Struct. excav., unclassified	2,750 c. y.	1.00	.90	1.10
13. Creosoted common struct. timber	34.12 M bm.	180.00	200.00	200.00
14. Class A concrete	885.48 c. y.	20.00	18.00	18.00
15. Class AA concrete	6 c. y.	20.00	20.00	18.00
16. Reinforcing steel	77,215 lb.	.05	.05	.05
17. 18-in. rein. conc. pipe	168 l. f.	3.00	3.50	3.00
18. 24-in. rein. conc. pipe	616 l. f.	3.60	4.00	3.50

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UNIT 1020
DUNN COUNTY

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19. 30-in. rein. conc. pipe	96 l. f.	$5.00	$5.00	$4.00
20. 6-in. integral curb	530.92 l. f.	.37	.40	.40
21. Concrete curb (6x12-in.)	51,453.6 l. f.	.40	.40	.38
22. Concrete curb (6x13-in.)	53.6 l. f.	.45	.40	45
23. 1½-ft. comb. curb and gutter	2,397.2 l. f.	1.20	1.20	1.20
24. Remove concrete pavement	21,074.6 s. y.	.27	.25	.25
25. Asph. surf. and gravel removed	44,423 s. y.	.22	.20	.20
26. Monument	1 ea.	10.00	15.00	10.00
27. Right-of-way markers	178 ea.	2.20	3.00	2.00
28. Bermuda tuft sodding	228,666 s. y.	.025	.03	.03
29. Water for sodding	2,286.66 M gal.	1.00	1.00	1.00
30. 12-in. rein. concrete pipe	120 l. f.	2.00	2.00	2.00
31. 15-in. rein. concrete pipe	128 l. f.	2.50	2.00	2.50
32. 18-in. bit. coated corr. met. pipe	80 l. f.	3.30	3.00	3.50
33. 24-in. bit. coated corr. met. pipe	120 l. f.	4.40	4.00	4.50
34. 30-in. bit. coated corr. met. pipe	70 l. f.	6.00	5.50	6.00
35. 36-in. bit. coated corr. met. pipe	20 l. f.	7.70	8.00	8.00
36. 18-in. rein. concrete pipe	774 l. f.	.90	1.00	1.00
37. Relay 15-in. concrete pipe (rein.)	33 l. f.	.90	1.00	1.00
38. Relay 12-in. steel pipe	40 l. f.	.70	1.00	1.00
39. Relay 15-in. steel pipe	18 l. f.	.70	1.00	1.00
40. Relay 30-in. corr. metal pipe	32 l. f.	1.00	2.00	1.00
41. 6-in. concrete dividing strip	9,482.8 s. y.	2.20	2.25	2.24
42. Guide posts	136 ea.	2.10	2.00	2.00
43. Reflect. curb markers (crystal)	2,372 ea.	1.50	2.00	1.50
44. 6-in. black traffic stripe	146,779 l. f.	.025	.03	.025
45. 6-in. black traffic arrow	496 l. f.	.12	.20	.10
46. 2-in. electrical conduit	1,280 l. f.	1.65	2.00	1.50
47. Sand for blotting armor coat	4.5 c. y.	3.50	2.00	3.00
48. Asph. for armor coat seal	1,136 gal.	.12	.10	.11
49. Aggregate for armor coat seal	25 c. y.	4.50	2.00	3.00
50. Plain riprap	3.92 c. y.	4.00	2.00	2.00
51. 6-in. water treated subgrade	193,320 s. y.	.04	.04	.04
52. HES portland cem. conc. pavement	30,119.9 s. y.	2.22	2.23	2.24
53. Shoulders	0.007 mi.	325.00	300.00	300.00
54. Portland cem. conc. pavmt. (9–6–9–in.)	205.33 s. y.	2.02	2.03	2.10
55. Struct. excavation, unclassified	3,000 c. y.	1.00	.80	1.00
56. Remove existing structures	1 ea.	200.00	200.00	150.00
57. Class A concrete	604.9 c. y.	20.00	21.00	20.00
58. Reinforcing steel	69,560 lb.	.05	.05	.05
59. Concrete curb (6x12-in.)	84 l. f.	.40	.40	.38
60. Conc. pavement removed	135 s. y.	.27	.25	.25
61. Guide posts	6 ea.	2.10	2.00	2.00
62. Bermuda tuft sodding	260 s. y.	.025	.03	.03
63. Water for sodding	2.6 M gal.	1.00	1.00	1.00
64. 6-in. conc. dividing strip	14 s. y.	2.20	2.25	2.24
65. Reflector curb marker (crystal)	4 ea.	1.50	2.00	1.50
66. 6-in. black traffic stripe	210 l. f.	.025	.03	.025
67. 6-in. water treated subgrade	233.3 s. y.	.04	.04	.04
68. Shoulders	0.007 mi.	325.00	300.00	300.00
69. Portland cem. conc. pavm. (9–6–9-in.)	200.44 s. y.	2.02	2.03	2.10
70. Structural excav., unclassified	470 c. y.	1.00	.80	1.00
71. Remove existing structures	1 ea.	150.00	200.00	150.00
72. Rein. conc. hand rail	83.1 l. f.	2.10	2.00	2.00
88. Class A concrete	186.4 c. y.	20.00	21.00	20.00
89. Reinforcing steel	17,980 lb.	.05	.05	.05
90. 6x12-in. concrete curb	45 l. f.	.40	.40	.38
91. Asph. surf. and gravel base removed	45 s. y.	.22	.20	.20
92. Bermuda tuft sodding	40 s. y.	.025	.03	.03
93. Water for sodding	0.4 M gal.	1.00	1.00	1.00
94. 6-in. conc. dividing strip	7.5 s. y.	2.20	2.25	2.24
95. Reflect. curb marker (crystal)	2 ea.	1.50	2.00	1.50
96. 6-in. black traffic stripe	112.5 l. f.	.025	.03	.025
97. 6-in. water treated subgrade	125 s. y.	.04	.04	.04
98. Class D excavation, unclassified	1,400 c. y.	.27	.30	.28
99. Substructure excav., common	580 c. y.	1.65	1.50	1.00
100. Substructure excav., rock	25.4 c. y.	10.00	10.00	10.00
101. Remove existing structure	1 ea.	400.00	500.00	400.00
102. Rein. concrete handrail	224.5 l. f.	2.10	2.00	2.00
103. Structural steel	140,000 lb.	.07	.069	.07
104. Class A concrete	253 c. y.	20.00	21.00	22.25
105. Class A conc. (P. & B. base)	95.2 c. y.	25.00	25.00	22.25
106. Class AA concrete	160.3 c. y.	20.00	20.00	22.25
107. Reinforcing steel	66,370 lb.	.05	.05	.05
108. Rein. conc. test pile	2 ea.	200.00	200.00	200.00
109. Untreated timber pile	540 l. f.	1.25	1.50	1.25
110. Rein. concrete piling	945 l. f.	4.00	5.00	4.00
111. Asph. surf. and gravel base removed	28 s. y.	.22	.20	.20
112. Reflect. curb markers (crystal)	24 ea.	1.50	2.00	1.50
113. 6-in. black traffic stripe	556.7 l. f.	.025	.03	.025
114. Shoulders	.005 mi.	325.00	300.00	300.00
115. Port. cem. conc. pavmt. (9–6–9-in.)	132.78 s. y.	2.02	2.03	2.10
116. Struct. excavation, unclassified	175 c. y.	1.00	.80	1.00
117. Rein. concrete handrail	54.5 l. f.	2.10	2.00	2.00
118. Class A concrete	209.1 c. y.	20.00	21.00	20.00
119. Reinforcing steel	18,360 lb.	.05	.05	.05
120. 6x12-in. conc. curb	54.32 l. f.	.40	.40	.38
121. Asph. surf. and gravel base removed	54.3 s. y.	.22	.20	.20
122. Bermuda tuft sodding	48 s. y.	.025	.03	.03
123. Water for sodding	0.48 M gal.	1.00	1.00	1.00
124. 6-in. concrete dividing strip	9.05 s. y.	2.20	2.25	2.24
125. Reflect. curb marker (crystal)	4 ea.	1.50	2.00	1.50
126. 6-in. black traffic stripe	135.8 l. f.	.025	.03	.025
127. 6-in. water treated subgrade	150.9 s. y.	.04	.04	.04

CLOVERLEAF BRIDGE AND HIGHWAY MARYLAND

OWNER: State Roads Commission of Maryland, Baltimore.

PROJECT: Construction of steel and concrete cloverleaf bridge, including leaves and drives, in connection with the North Point Road relocation from Moffett Avenue to the Baltimore City line, Baltimore, Md. Bridge project at intersection of North Point Road and Eastern Avenue. (Contract No. B-463-2-466). Entire project involves 1.315 miles highway construction.

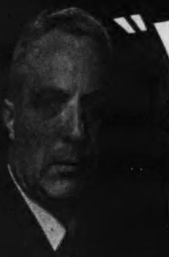
CONDITIONS: Contractor to furnish all materials and co plete work in 125 working days. Rail and highway tra portation facilities available. Minimum wage rates are: skil labor, 70c. per hr.; semi-skilled, 55c.; and common, 40c.

BIDS: Three bids were received in early April, 1942, rangi from the contract low of $941,115 to $1,367,619.

LIST OF BIDDERS:

1. C. J. Langenfelder & Son, Rosedale, Md. (contract)	$941,1
2. Williams Constr. Co., Middle River, Md	1,044,7
3. Frank Carozza, Baltimore, Md	1,367,6

Item	Quan.	Unit Prices		
		(1)	(2)	(3)
1. Clearing and grubbing	L. S.	$5,000.00	$3,000.00	$30,000
2. Class 1 excavation	221,500 c. y.	.40	.45	
3. Class 2 excavation	10,200 c. y.	1.25	2.00	
4. Class 5 excavation	2,100 c. y.	.80	1.00	5.
5. Borrow excavation	378,500 c. y.	.49	.75	2.
6. Tamped fill	5,900 c. y.	.80	1.00	
7. Earth shoulders	5,000 s. y.	.20	.15	2.
8. Seeding park area	685 M s. f.	8.00	10.00	15.
9. Furn. place topsoil, 6-in.	22,600 s. y.	.35	.35	
10. Furn. place topsoil, 3-in	54,000 s. y.	.25	.25	
11. Sodding	8,200 s. y.	.30	.40	
12. Trim existing ditches	500 ft.	.20	.30	
13. Seeding and mulching	34,500 s. y.	.20	.23	
14. 5-in. macadam base course	7,700 s. y.	.80	.80	
15. 3-in. waterbound macadam sub-base	51,800 s. y.	.45	.50	
16. 3-in. penet. macadam sub-base	51,800 s. y.	.45	.50	
17. Stabilized base course	2,150 ton	2.00	1.50	2.
18. Calcium chloride	25 ton	40.00	35.00	50.
19. Sub-base, type 2	7,800 c. y.	1.75	2.00	2.
20. Screenings, surf. course (slag)	200 ton	2.25	2.50	3.
21. Screenings, surf. course for shoulder stabilization	12,850 s. y.	.38	.35	.
22. Penet. macadam surf. crse. (X-sec. impr.)	7,700 s. y.	.70	.80	1.0
23. Bitum. material, penetration macadam	124,300 gal.	.105	.10	.1
24. 10–8-in. plain. cem. conc. pavmt. (A-reg.)	16,700 s. y.	3.20	3.20	3.5
25. 10–8-in. plain. cem. conc. pavmt. (XE-S)	600 s. y.	3.60	3.50	4.0
26. 9–9-in. plain. cem. conc. pavmt. (A-reg.)	7,200 s. y.	3.50	3.25	3.
27. 9–9-in. plain cem. conc. pavmt. (XE-S)	300 s. y.	3.75	3.60	4.3
28. Bitum. surf. crse., spec. B	51,800 s. y.	.45	.50	.5
29. Bitum. surf. crse., spec. C	80 ton	10.00	10.00	12.0
30. Top dressing	4 ton	5.00	10.00	12.0
31. Asph. conc. base crse., spec. B	51,800 s. y.	.70	.75	.7
32. 6-in. vit. clay or conc. pipe outlets	200 l. f.	.65	.60	.7
33. 8-in. vit. clay of conc. pipe underdrain	800 l. f.	.75	.70	.8
34. 6-in. perf. vit. clay or conc. pipe underdrain	4,000 l. f.	.70	.60	.7
35. 8-in. perf. vit. clay or conc. pipe underdrain	500 l. f.	.85	.70	.8
36. 15-in. rein. concrete pipe	2,894 l. f.	1.75	1.75	2.00
37. 18-in. rein. concrete pipe	820 l. f.	2.10	2.20	2.50
38. 24-in. rein. concrete pipe	883 l. f.	3.00	3.00	4.00
39. 36-in. rein. concrete pipe	272 l. f.	5.00	6.00	7.00
40. 48-in. rein. concrete pipe	670 l. f.	9.50	9.00	12.00
41. 15-in. c.i. pipe (A. R. E. A. spec.)	20 l. f.	7.00	6.00	10.00
42. 15-in. asph. coated cor. metal pipe	365 l. f.	2.50	2.50	3.00
43. 6-in., 90-deg. pipe elbow, conc. or vit. clay	1 ea.	2.00	3.00	10.00
44. 15-in., 90-deg. rein. conc. pipe elbow	2 ea.	6.00	10.00	20.00
45. 6x8-in. vit. clay or conc. pipe tee sect	1 ea.	3.00	5.00	10.00
46. 15x24-in. rein. conc. pipe tee sect	1 ea.	20.00	15.00	30.00
47. 15x36-in. rein. conc. pipe tee sect	1 ea.	30.00	40.00	40.00
48. 15x48-in. rein. conc. pipe tee sect	1 ea.	40.00	60.00	50.00
49. 11x18-in. asph. coat. cor. met. pipe (Int. B)	141 l. f.	3.00	3.00	3.50
50 25x44-in. asph. coat. cor. met. pipe (Int. B)	177 l. f.	8.50	8.00	12.00
51. Relaid pipe (any size)	100 l. f.	1.50	1.50	3.00
52. Treated Class A timber piles	7,260 l. f.	1.50	1.70	2.50
53. Test piles	40 l. f.	3.00	2.00	2.50
54. Aggregate for underdrains	375 c. y.	3.50	3.50	4.00
55. Cl. A conc. pipe endwalls (A-reg.)	95 c. y.	45.00	40.00	50.00
56. Class A concrete (A-reg.)	4,190 c. y.	30.00	30.00	40.00
57. Class B concrete (B-reg.)	50 c. y.	25.00	28.00	30.00
58. Class A conc. balustrade (A-reg.)	8 c. y.	70.00	60.00	100.00
59. Reinforcing steel bars	341,300 lb.	.06	.07	.06
60. Fabricated structural steel	881,500 lb.	.07	.06	.07
61. Stringer spirals	8,900 lb.	.32	.15	1.00
62. Damp-proofing (Sta. 387)	L. S.	1,200.00	600.00	5,000.00
63. Stone backfill	440 c. y.	4.50	4.00	10.00
64. Furn., install fiber conduits	L. S.	3,500.00	1,000.00	8,000.00
65. Expansion mat'l in bridge (Sta. 387)	L. S.	1,500.00	600.00	5,000.00
66. 5-in. plain cement conc. gutter (A-reg.)	300 s. y.	3.00	3.00	3.30
67. Comb. cement conc. curb and gutter	23,500 l. f.	1.50	1.25	2.00
68. White cem. conc. sep. curb (A-reg.)	1,500 l. f.	3.20	2.00	4.00
69. 8x18-in. plain. cem. conc. curb	1,700 l. f.	1.30	1.00	1.50
70. 5-in. concrete sidewalk	18,600 s. f.	.32	.35	.40
71. Guard rail posts	321 ea.	2.50	2.50	6.00
72. Maintenance of traffic	L. S.	2,500.00	5,000.00	20,000.00
73. Timber railing	L. S.	4,000.00	2,000.00	5,000.00
74. Manhole, over 12-ft. in height	1 ea.	250.00	500.00	400.00
75. Manhole, less than 12-ft. in height	8 ea.	200.00	200.00	250.00
76. Removal of all buildings	L. S.	7,500.00	1,000.00	5,000.00
77. Electric lighting system	L. S.	29,100.00	28,000.00	30,000.00
78. Type E combination inlets	10 ea.	160.00	150.00	200.00
79. Type H combination inlets	20 ea.	200.00	175.00	250.00
80. Type K inlet grates	8 ea.	35.00	125.00	150.00
81. Drainage for bridge	L. S.	5,000.00	5,000.00	5,000.00
82. Cedar posts	70 ea.	4.50	3.00	5.00



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The BIG Concrete Jobs are SMITH-MIXED

HIGHWAY AND BRIDGE
MISSOURI

OWNER: Missouri State Highway Commission, Jefferson City; C. W. Brown, chief engineer.

PROJECT: Improvement of 3.269 miles of U. S. Route 71, near Neosho, Newton County, Mo. Includes grading, culverts, portland cement concrete (non-reinforced) pavement, and reinforced concrete bridge. Pavement width 22-ft.; thickness 8½-in. uniform.

CONDITIONS: Contractor to furnish all materials and complete work in 160 working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.00 to $1.35 per hr.; semi-skilled, 57½ to 90c.; and common, 55c.

LIST OF BIDDERS: Opening April 24, 1942.

1. J. M. Roark, Anderson, Mo., and Poole Constr. Co., Kansas City, Mo. (contract)	$331,071
2. Atkinson-Windle Co., Chillicothe, Mo., and Fred Weber, Jr., St. Louis, Mo.	351,438
3. Harrison Engr. & Constr. Corp., Kansas City, Mo.	375,257

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing	46.2 ac.	$120.00	$75.00	$100.00
2. Grubbing	46.2 ac.	30.00	75.00	100.00
3. Class A excavation	170,714 c. y.	.44	.415	.38
4. Class C excavation	45,285 c. y.	.44	1.00	1.30
5. Class 3 excav.: structures	2,819.5 c. y.	2.25	2.50	2.50
6. Compacting embankment (rolling)	161,428 c. y.	.04	.03	.05
7. Compacting in cuts (rolling)	15,725 c. y.	.20	.20	.20
8. Removing pavement	1,604 s. y.	.25	.60	.40
9. Removing sidewalk	22 s. y.	.50	.50	.40
10. Water (compacting, rolling)	31,888 hund. gal.	.02	.05	Free
11. Chat or cr. stone surface	546 c. y.	2.00	3.00	2.50
12. Portland cement conc. pavement	61,074.1 s. y.	2.60	2.53	2.60
13. Class B conc. (box culvert)	882.4 c. y.	28.00	27.50	35.00
14. Class B conc. (other than box culv.)	26.0 c. y.	50.00	60.00	50.00
15. 15-in. concrete culvert pipe	904 l. f.	2.00	2.25	2.00
16. 18-in. concrete culvert pipe	297 l. f.	3.00	2.75	3.00
17. 24-in. concrete culvert pipe	208 l. f.	4.00	3.50	4.00
18. Relaid pipe culverts	376 l. f.	1.50	1.50	1.50
19. Reinforcing steel	79,400 lb.	.06	.06	.06
20. Heavy stone revetment	50 s. y.	4.00	5.00	8.00
21. Class C underdrains (tile)	792 l. f.	1.00	2.00	1.00
22. Class C underdrains (French)	100 l. f.	1.00	2.00	1.00
23. Seeding	56.1 ac.	60.00	100.00	100.00
24. Barricades	6 ea.	40.00	50.00	50.00
25. Relocating barricades	6 ea.	30.00	20.00	30.00
26. Cl. 3 excav., for bridge struct	660 c. y.	2.00	2.00	2.00
27. Class B concrete (bridge)	328.5 c. y.	28.00	26.00	35.00
28. Reinforcing steel (bridge)	32,650 lb.	.06	.06	.06

HIGHWAY AND BRIDGES
PENNSYLVANIA

OWNER: Pennsylvania State Highway Dept., Harrisburg; T. C. Frame, chief engr.; E. E. Brandow, bridge engr.

PROJECT: Construction of 18,713 linear feet of graded and drained highway, 34 to 66-ft. and varying in width, including five concrete structures. Also including 820 linear feet of concrete paving, 48-ft. and varying in width; 18 ft. of bituminous surfacing for paving railroad crossing; two timber deck bridges, one reinforced concrete deck bridge, and concrete abutment for structural steel bridge. Located on Legislative Route 170, Section 17 (Traffic Route 309) in Luzerne County, Pa.

CONDITIONS: Contractor to furnish all materials except steel for bridges which must be salvaged from State Highway-owned stocks located at various points throughout the state. Some of this must be reworked and fabricated to the requirement of this project. Material for bridge floorings has not been decided upon. Steel must be reclaimed, straightened and transported by contractor. Rail and highway transportation facilities available to site of work. Time for completion 365 calendar days. Minimum wages specified are: skilled labor, 75c. per hour; semi-skilled, 50c.; and common, 45c.

BIDS: Four bids were received August 7, 1942, ranging from the contract low of $608,621 to $770,478.

LIST OF BIDDERS:

1. Laub & Collins, Somerset, Pa. (contract)
2. H. J. Williams Co., Inc., York, Pa.
3. B. C. Banks Constr. Co., Wilkes-Barre, Pa.
4. A. B. Cole, Meshoppen, Pa.

Item	Quan.	Unit Prices (1)	(2)
1. Clearing and grubbing	L.S.	$8,000.00	$7,500.00
2. Class 1 excavation	240,260 c. y.	.75	.75
3. Class 2 excavation	7,303 c. y.	2.50	4.00
4. Borrow excavation	316,510 c. y.	.45	.60
5. Subgrade	6,032 s. y.	.25	.20
6. Shoulders	1,520 l. f.	.40	.30
7. Cement concrete paving, 9-in	6,032 s. y.	4.00	3.30
8. Bit. wear. surf., HE-T for bridge floors (top crse. matl.) excl. seal coat	15 ton	15.00	11.00
9. Bit. surf. crse., HE-T, excl. seal coat	51 ton	15.00	11.00
10. Seal coat for bit. surf. crse. HE-T.	277 s. y.	1.50	.30
11. Class A concrete	138 c. y.	40.00	35.00
12. Class B concrete	6,517 c. y.	22.50	23.00
13. Cl. B concrete for (encasement)	159 c. y.	22.50	24.00
14. Class B concrete for (divisor)	19 c. y.	22.50	24.00
15. Ties for tie grillage	76 ea.	3.00	3.00
16. Stone backfill, structures	334 c. y.	5.00	4.00
17. Timber test piles (4 per ea. 32-ft.).	L.S.	2,500.00	1,300.00
18. 32-ft. timber piles	224 l. f.	1.00	.90
19. 26-ft. timber piles	156 l. f.	1.25	.90
20. 20-ft. timber piles	380 l. f.	1.50	1.00
21. 14-ft. timber piles	392 l. f.	1.50	1.00
22. Cement rubble masonry	63 c. y.	25.00	24.00
23. Pressure grout surface	726 s. y.	5.00	4.50
24. Cl. B cem. conc. pavmt. for stream beds, 6-in. deep	36 c. y.	17.50	35.00
25. Type E inlets	5 ea.	150.00	125.00
26. Type F inlet	1 ea.	250.00	135.00
27. 18-in. vit. clay pipe (to be encased).	58 l. f.	3.75	4.00
28. 24-in. vit. clay pipe (to be encased).	202 l. f.	5.50	5.50
29. 30-in. vit clay pipe (to be encased).	106 l. f.	7.00	9.50
30. Plain cem. conc. pipe, 42-in. (encased)	148 l. f.	11.00	12.00
31. 15-in. triple strength vit. clay pipe.	904 l. f.	3.25	4.00
32. 18-in. as above	734 l. f.	3.75	5.00
33. 24-in. as above	794 l. f.	5.50	7.00
34. 30-in. as above	368 l. f.	7.00	12.00
35. 4-in. tile underdrain	3,000 l. f.	1.00	1.00
36. 6-in. tile underdrain	500 l. f.	1.10	1.20
37. Stone found. underdrain, Type A	2,000 l. f.	.90	.50
38. 4-in. tile outlet	300 l. f.	.90	.80
39. 6-in. tile outlet	50 l. f.	.90	1.00
40. Plain cem. conc. curb and gutter, type C	343 s. y.	4.50	4.00
41. Straight stone curb, type A	801 l. f.	3.50	3.25
42. Curved stone curb, type A	144 l. f.	4.50	5.00
43. Reset curb	1,345 l. f.	1.25	2.50
44. Redressed, reset stone curb	264 l. f.	2.00	3.70
45. Place plain steel bars	L.S.	4,155.00	1,500.00
46. Place salvaged struct. steel	L.S.	25,000.00	10,000.00
47. Lumber	14 Mbm.	350.00	130.00

HIGHWAY AND BRIDGE
MISSISSIPPI

OWNER: Mississippi State Highway Commission, Jacks

PROJECT: Grading, drainage structures, bridges and asph surfacing 11.353 miles of the Aberdeen-Columbus Highway Monroe and Lowndes Counties, Miss. This access roadway h width of 30-ft., 20-ft. of which is surfaced with asphalt. Brid length 0.226 miles. Thickness of roadway surfacing at cent is 4-in.; and at sides, 4-in.

CONDITIONS: Contractor to furnish all materials and com plete work in 210 working days. Rail and highway transport tion facilities available. Wage rates specified are: skill labor, 75c. per hr.; semi-skilled, 40c.; and common labor, 30 Project has high priority rating.

BIDS: Three bids were opened June 9, 1942, ranging from th contract low of $664,121 to $683,257. Bids were original taken on May 26, 1942, but were rejected, and job wa readvertised.

LIST OF BIDDERS:

1. Trinidad Asphalt Mfg. Co., St. Louis, Mo. (contract)	$664.1
2. W. G. Cook, Jackson, Miss	674.6
3. Chandler Bros., Inc., Virgilina, Va	683.2

Roadway

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L.S.	$15,000.00	$10,000.00	$16,000.0
2. Random clearing and grubbing	29 ac.	150.00	150.00	150.0
3. Remove asphaltic pavement	2,398 s.y.	.40	.30	.4
4. Dynamite	6,280 lb.	.30	.40	.3

Easy to Answer!

▸▸ *Question:* What is the safe, quick, economical way to handle a load that is

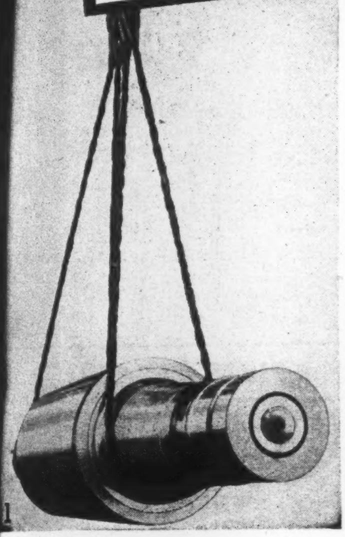
HEAVY . . . like a turbine cover?

HIGHLY FINISHED . . . like a paper mill roll?

IRREGULAR . . . like a casting?

FRAGILE . . . like a crate of plate glass?

See Answer Below



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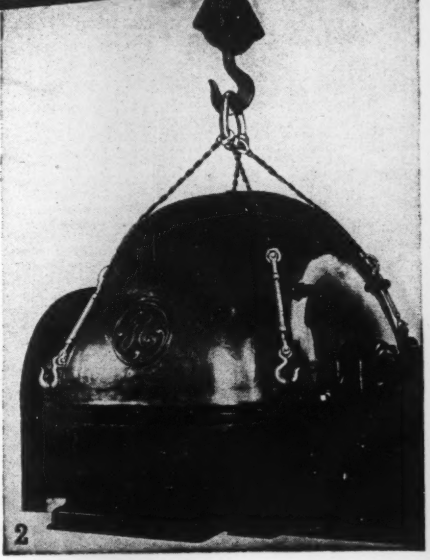

2

1 Handling big steel mill roll without harming smooth finish.

2 Turbine cover is kept level and exactly fitted in place.

3 Sling grips glass crate by edges; no hooks, no damage.

3

The answer to handling *any* "problem" load more easily is a Yellow Strand Wire Rope Plaited Safety Sling.* Flexible, light-weight and kink-proof, this patented type will hoist a locomotive or a barrel with equal security. Each sling has the *stamina* of Yellow Strand Wire Rope. Braided by our expert splicers, its exceptional *pliability* enables it to grip a load softly, snugly and without damage to a delicate surface.

By adding hooks, thimbles, links, shackles, turnbuckles or other fittings, standard Yellow Strand Plaited Safety Slings* are adaptable to products of varied size and shape. If you need a special sling for your special problem, our engineers will design one promptly. For more efficient, more *economical* handling of materials, investigate Yellow Strand Plaited Safety Slings.*

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* MURRAY PATENTS: U. S., 1475859, 1524671; CANADIAN, 252874, 258068

5. Unclassified excavation	335,536 c.y.	.32	.35	.37
6. Haul of excavation	5,388,328 sta.y.	.0025	.0025	.0025
7. Haul of excavation (c.y. ½-mi.)	215,393 units	.04	.05	.05
8. Haul of selected mat'l. (c.y. ½-mi.)	299,439 units	.04	.05	.05
9. Roadbed topping	93,339 c.y.	.34	.35	.40
10. Clay gravel base course	145,969 s.y.	.45	.40	.30
11. Mulching	438,878 s.y.	.035	.03	.035
12. Sprigging	517,215 s.y.	.03	.03	.04
13. Solid sodding	10,750 s.y.	.30	.30	.35
14. Commercial fertilizer (4:8:4)	42.94 ton	50.00	60.00	50.00
15. 18-in. pipe culvert (alt. 1)	510 l.f.	3.00	3.00	2.80
16. 24-in. pipe culvert (alt. 1)	435 l.f.	4.00	4.00	4.00
17. 30-in. pipe culvert (alt. 1)	216 l.f.	5.50	6.00	6.00
18. 15-in. pipe culvert (alt. 1)	186 l.f.	2.00	2.00	2.00
19. 18-in. pipe culvert (alt. 1)	159 l.f.	2.50	2.50	2.50
20. Gratings	548 lb.	.30	.30	.30
21. Class B culvert concrete	597.13 c.y.	32.00	30.00	29.00
22. Class B struct. concrete	5.79 c.y.	40.00	35.00	30.00
23. Mod. asph. conc. base crse	135,313 s.y.	.70	.75	.70
24. Type A mod. sand asph. surf. course	135,313 s.y.	.48	.50	.59
25. Tar for prime coat	43,300 gal.	.17	.16	.17
26. Extra asphalt cement	300 ton	1.00	8.00	5.00
27. Concrete header	160 l.f.	1.00	1.00	1.25
28. Rein. cem. conc. bridge end pavmt	322 s.y.	5.00	7.00	6.00
29. Reflectorized warning signs	L.S.	250.00	500.00	400.00
30. Cold lay bitum. conc. RR crossing	L.S.	590.53	500.00	346.38
31. Reinforcing steel	88,528 lb.	.07	.07	.06
32. Reset right-of-way markers	5 ea.	2.00	2.00	1.50
33. Right-of-way markers	147 ea.	2.00	2.50	2.50
34. Rt-of-way markers (easements)	100 ea.	2.00	2.50	2.50
Bridges				
35. Bridge excavation	350 c.y.	5.00	10.00	8.00
36. Gravel surf. crse. (clay gravel ballast)	0.66 c.y.	5.00	4.00	5.00
37. Class B bridge concrete	1,357.6 c.y.	35.00	32.50	33.00
38. Class C bridge concrete	165.3 c.y.	50.00	37.50	37.50
39. Seal concrete	97.2 c.y.	25.00	25.00	30.50
40. Structural steel	77,610 lb.	.09	.10	.09
41. Steel superstructure	L.S.	19,000.00	20,000.00	18,000.00
42. Treated timber	11.189 Mbm.	250.00	200.00	200.00
43. Reinforcing steel	341,130 lb.	.07	.07	.07
44. Railing	2,100 l.f.	4.00	4.00	3.00
45. Untreated timber piling	2,400 l.f.	1.50	1.00	1.00
46. Treated timber piling	752 l.f.	2.00	2.00	2.00
47. Precast concrete piling	6,975 l.f.	4.50	4.50	4.50
48. Timber trestle	L.S.	955.85	1,200.00	1,200.00
49. Test piles (concrete)	11 ea.	200.00	250.00	250.00
50. Loading tests	6 ea.	150.00	150.00	150.00
51. Concrete slope paving	155 c.y.	25.00	25.00	25.00

BRIDGES, TEXAS

OWNER: Texas State Highway Dept., Austin.

PROJECT: Construction of Lampasas River, Lampasas River Relief and Sulphur Creek Bridges between Kempner and Lampasas on U. S. Highway 190, in Lampasas County, Tex. Reinforced concrete girder type construction; length 0.144 miles; roadway width, 24-ft.

CONDITIONS: Contractor to furnish all materials and complete work in 130 working days. Rail and highway facilities available. Preference rating A-1-e requested. Wage rates are: skilled labor, $1.00 per hr.; semi-skilled, 50c.; common, 40c.

BIDS: Eight bids were received April 28, 1942, ranging from the contract low of $105,370 to $144,993.

LIST OF BIDDERS:

1. John F. Buckner, Cleburne, Tex. (contract)	$105,370
2. R. R. Tway, Oklahoma City, Okla	106,856
3. Ernest Loyd, Fort Worth, Tex	111,749
4. Cage Bros. & L. A. Turner, Bishop, Tex	112,505
5. W. S. Crawford, Dallas, Tex	113,885
6. Austin Bridge Co., Dallas, Tex	118,597
7. Ben Sira & Co., Dallas, Tex	127,629
8. Standard Paving Co., Fort Worth, Tex	144,993

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Unclassified channel excav.	298 c. y.	$0.50	$1.00	$1.00
2. Unclassified struct. excav.	514 c. y.	4.25	6.00	4.00
3. Class A concrete (slabs)	1,375 c. y.	24.90	26.00	26.00
4. Class A concrete (piers)	279.6 c. y.	23.10	24.00	26.00
5. Class A concrete (bents)	194 c. y.	24.95	24.00	26.00
6. Reinforcing steel	405,019 lb.	.0575	.055	.059
7. Cast steel bearing plates	20,484 lb.	.21	.20	.22
8. Remove old structures (bridges)	2 ea.	1,200.00	2,250.00	2,800.00
9. 15-in. square precast conc. piling	1,608 l. f.	3.85	3.50	4.00
10. 16-in. octagon. precast conc. piling	3,070 l. f.	4.30	4.50	4.00
11. Railing (special, traffic)	970 l. f.	4.00	2.50	3.50
12. Railing (special, pedestrian)	554.5 l. f.	5.00	3.25	6.00
13. Dry riprap, type A	323 c. y.	4.00	5.00	5.00
14. Grouted riprap, type A	15 c. y.	9.25	10.00	12.00
15. Remove old structures (culvert)	1 ea.	35.00	50.00	100.00

HIGHWAY BRIDGE, TEXAS

OWNER: Texas State Highway Commission, Austin.

PROJECT: Construction of reinforced concrete and bridge across the Leon River, approximately two miles of Belton, Bell County, Tex., on Highway No. 317. Pr length 0.136 miles.

CONDITIONS: Contractor furnishes all materials. Rail highway transportation facilities available. Prevailing to be paid.

BIDS: Ten bids were received December 15, 1942, ran from the low of $122,253 to $169,767.

LIST OF BIDDERS:

1. C. H. Harrison, Waco, Tex. (low bidder)	$122
2. Wallace & Bowden, Dallas, Tex	127
3. Ernest Loyd, Fort Worth, Tex	128
4. Ben Sira & Co., Dallas, Tex	134
5. Cage Bros. & Turner, Bishop, Tex	140
6. M. E. Worrell, Austin, Tex	146
7. Austin Bridge Co., Dallas, Tex	149
8. Southern Contracting Co., Austin, Tex	155
9. Standard Paving Co., Fort Worth, Tex	168
10. Dean Word, San Antonio, Tex	169

Item	Quan.	Unit Prices (1)	(2)
1. Clearing and grubbing	2.9 ac.	$150.00	$200.00
2. Unclass. struct. excav	1,901 c. y.	4.00	6.00
3. Class A conc. (girders and slab)	1,143.5 c. y.	28.50	25.00
4. Class A conc. (bents)	389.2 c. y.	22.50	25.00
5. Class A conc. (piers)	732.6 c. y.	24.50	28.00
6. Class B conc. (caissons)	52 c. y.	15.50	16.00
7. Class E conc. (seal)	87.6 c. y.	17.00	18.00
8. Reinforcing steel	339,055 lb.	.055	.055
9. Structural steel	15,060 lb.	.20	.18
10. Cast steel bearing plates	11,560 lb.	.25	.30
11. Remove old structures	Lump Sum	7,500.00	4,000.00
12. 15-in. sq. precast conc. piling	2,630 l. f.	4.00	5.25
13. Special railing	1,440 l. f.	2.55	3.00

BRIDGE PIERS, TEXAS

OWNER: Texas State Highway Commission, Austin; D. Greer, State Highway Engineer.

PROJECT: Construction of two concrete caisson-type pie for main span of proposed Little River Bridge on State Hig way 36 and U. S. Route 77 in Milan County, about one mi southeast of Cameron, Tex.

CONDITIONS: Contractor to furnish all material except rei forcing steel, and complete work in 110 working days. Ra and highway transportation facilities available. Wage rat are: skilled labor, $1.00 per hour; semi-skilled, 50c; an common, 40c.

BIDS: Twelve bids were received January 26, 1943, rangin from the contract low of $25,823 to $46,657.

LIST OF BIDDERS:

1. Southern Contracting Co., Austin, Tex. (contract)	$25,8
2. Cage Bros. & L. A. Turner, Bishop, Tex	28,2
3. L. & L. Construction Co	28,5
4. Thomas & Ratliff, Rogers, Tex	31,0
5. M. E. Worrell, Austin, Tex	31,83
6. Austin Bridge Co., Dallas, Tex	33,03
7. Standard Paving Co., Fort Worth, Tex	34,813
8. Ernest Loyd, Fort Worth, Tex	37,833
9. Purvis & Bertram, Fort Worth, Tex	37,46
10. Wallace & Bowden, and Norman Larson, Dallas, Tex	38,92
11. Charles Cohen, Dallas, Tex	39,22
12. Ben Sira & Co., Dallas, Tex	46,65

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Unclassified structural excav	985 c. y.	$4.50	$5.50	$6.0
2. Class A concrete	553.4 c. y.	25.00	26.00	26.0
3. Class B concrete	155.52 c. y.	21.00	22.00	22.0
4. Class E concrete	142.06 c. y.	19.00	24.00	16.0
5. Place reinforcing steel	58,798 lb.	.02	.02	
6. Structural steel	2,760 lb.	.15	.16	

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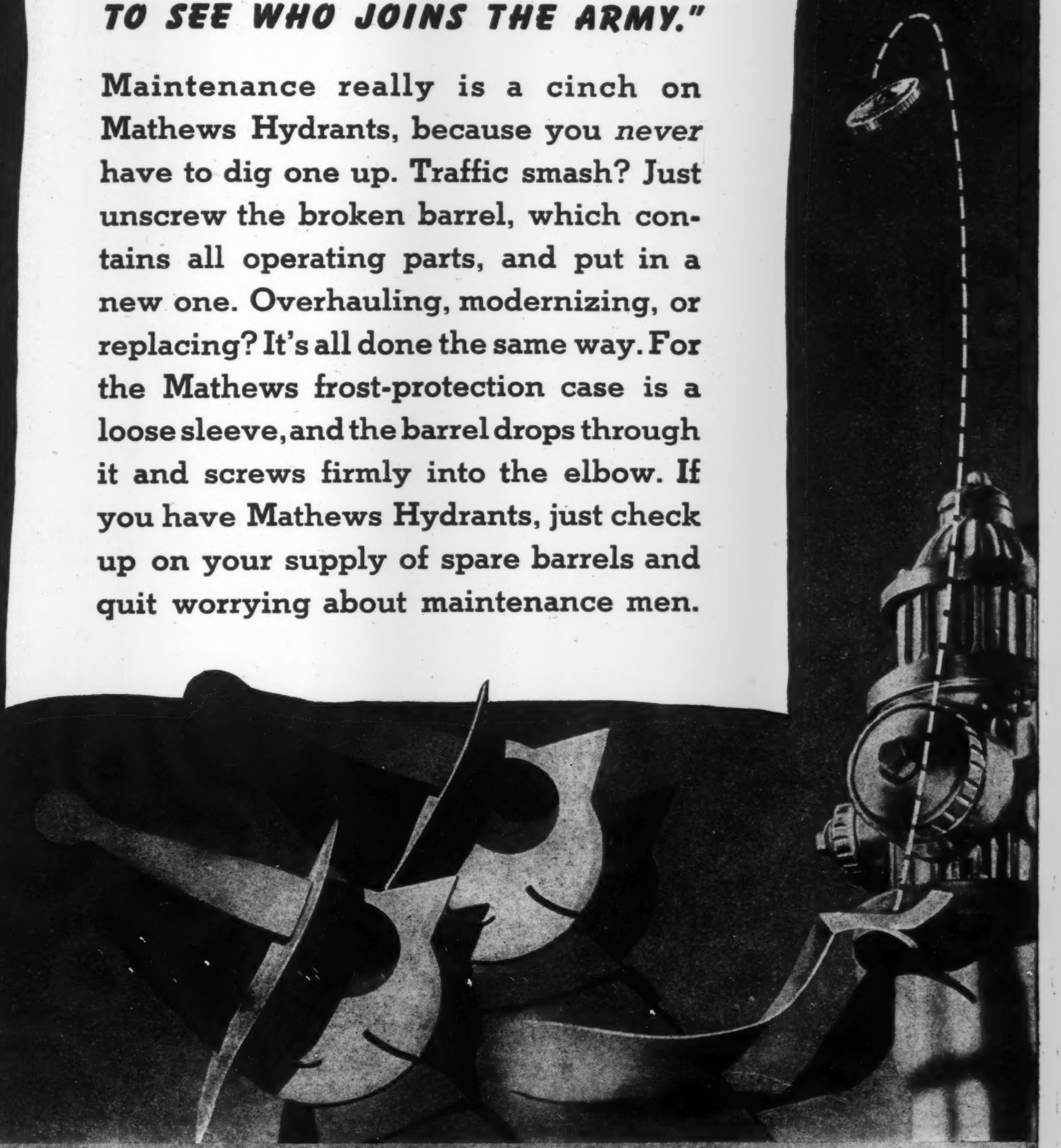

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SOUTH WESTERN AVENUE BRIDGE ALTERATIONS, CHICAGO

OWNER: Department of Public Works, Chicago.

PROJECT: Alteration of fixed bridge superstructure of South Western Avenue Bridge over Sanitary and Ship Canal in Chicago into vertical lift bridge. Includes replacement of concrete deck with timber and asphalt plank. Clearance of bridge unaltered is 26-ft.; after conversion, clearance will be 47-ft.

CONDITIONS: Contractor to furnish all materials, but city may furnish pile protection. Reduction in cost may be accomplished by eliminating all sheet piling at top. Time charge offset $300 per calendar day for 180 days. Total cost of project to depend on date bridge can be lifted. Deductions will be based on that time. Project carries an A-A priority rating. Electrical equipment bids were taken separately. Wage rates are: skilled labor, $1.625 to $2.00 per hour; semi-skilled, $1.10 to $1.70; and common labor, $1.02½ to $1.10.

BIDS: Two bids were opened July 27, 1942. Based on the 180-day time charge offset, they were the contract low of $470,945, and $473,315. Electrical equipment bids for motors and brakes, gates, switches, warning lights, transformers, cables, wires, telephones, control apparatus, etc., and the operation of the bridge for 30 days, were received August 3, 1942. The three bids opened were: the contract low of $83,565 from Divane Brothers; $93,174 from Fries Walters Co.; and $101,816 from Garden City Engineering Co.

LIST OF BIDDERS: (Alterations only)

1. William J. Howard, Inc., Chicago, Ill. (contract)	$470,945
2. Overland Constr. Co., Chicago, Ill.	473,315

Item	Quan.	Unit Prices (1)	(2)
1. Fences and sheds	L.S.	$14,000.00	$5,770.00
2. Furn. and del. struct. carbon steel	1,300,000 lb.	.07	.0727
3. Furn. and del. wire rope and attachments	3,500 l. f.	2.80	2.87
4. Furn. and del. steel forgings, excl. of machinery	5,000 lb.	.21	.22
5. Furn. and del. cast steel, excl. of machinery	13,000 lb.	.25	.26
6. Erect and alter steel as specified, excl. machinery	L.S.	87,000.00	74,630.00
7. Reinforcement metal	12,000 lb.	.09	.10
8. Standard portland cement	400 bbl.	3.00	3.00
9. High early strength cement	350 bbl.	3.50	3.50
10. Concrete, Cl. 1, excl. cement	60 c. y.	40.00	42.00
11. Concrete, Cl. 2, excl. cement	350 c. y.	30.00	32.00
12. Transport, handle and place salvaged comp. counterweight blocks	55 ton	10.00	12.00
13. Douglas fir and yellow pine	125 Mbm.	220.00	169.00
14. 1½-in. asphalt planking	1,300 s. y.	3.30	3.50
15. Removal of masonry	700 c. y.	40.00	54.00
16. Machinery, complete	L.S.	80,000.00	95,000.00
17. Operat. house machinery, enclosed platforms, stairways, railings	L.S.	42,000.00	43,000.00
18. Furniture, lockers and equipment	L.S.	400.00	200.00
19. Field painting, except house and encl. work	L.S.	6,000.00	3,500.00
20. Time charge offset, $300 per calendar day (180 days)	L.S.	54,000.00	54,000.00
21. Pre-heating and extra mixing of concrete	500 c. y.	4.00	5.50
22. Covering and heating concrete in place	500 c. y.	4.00	5.50
23. Mechanics' time, wages per hour	200 hr.	4.00	3.00
24. Laborers' time, wages per hour	300 hr.	3.00	2.00

WILLAMETTE RIVER BRIDGE OREGON

OWNER: Oregon State Highway Commission, Portland; G. S. Paxson, bridge engr.

PROJECT: Construction of two timber pile trestles each 95-ft. long, one timber pile trestle 75-ft. long, and one bridge consisting of 290-ft. of timber pile trestle and one 180-ft. Howe-truss span for bridge over coast fork of Willamette River, and pile trestle bridges on the Goshen-Pleasant Hill section of the Willamette Highway in Lane County, Ore., approximately 13 miles east of Eugene. Timber truss designed for H-15 loading and requires unusually heavy timbers due to extreme length of truss and width of roadway. Lower chords of timber truss are made up of three 14 x 16-in. timb upper chords are three 14 x 14-in. Floor beams are 14 x 3 Split ring timber connectors are used in all splices. Road stringers on truss consist of eleven lines of 6 x 18-in. string Deck made up of 4 x 12-in. planking laid transversely to ce line and covered with 2 x 2-in. Port Orford or red cedar st laid longitudinally.

CONDITIONS: Contractor to furnish all materials ex metal reinforcing for concrete piers, and complete work December 3, 1942. Highway transportation facilities availa Wage rates are: skilled labor, $1.20 per hr.; semi-skilled, 9 and common, 62½c.

BIDS: Three bids were received June 4, 1942, ranging fr $53,774 to $79,960.

LIST OF BIDDERS:

1. Tom Lillebo, Reedsport, Ore. (low bidder)	$53
2. C. J. Eldon, Portland, Ore	60
3. McNutt Brothers, Eugene, Ore	79

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Shoring, cribbing, etc	L. S.	$1,600.00	$7,500.00	$12,30
2. Structural excavation	70 c. y.	5.00	12.50	
3. Struct. excav. below elevations noted	5 c. y.	8.00	16.50	
4. Class A concrete	100 c. y.	33.00	30.50	
5. Transport and place reinforcing steel	7,000 lb.	.04	.04	
6. Furnish untreated piles	3,600 l. f.	.32	.25	
7. Drive untreated piles	120 ea.	19.00	25.00	
8. 180-ft. Howe truss span	1 ea.	22,600.00	27,500.00	20,90
9. Untreated trestle superstr. with 24-ft. roadway	300 l. f.	29.00	27.50	
10. Untreated trestle superstr. with 26-ft. roadway	280 l. f.	31.00	28.50	
11. Untreated lumber in trestle substr.	24 M bm.	108.00	110.00	11
12. Removal of old bridge	L. S.	2,200.00	5,040.00	1,20

BRIDGE, WEST VIRGINIA

OWNER: West Virginia State Road Comn., Charleston, W. V

PROJECT: Construction of South Charleston Overhead Brid (No. 1588), at South Charleston, Kanawha County, W. V Involves erection of 18 continuous concrete deck girder spa and 9 concrete slab spans on concrete substructure. Roadwa width 24-ft. on each of two lanes. Clearance over tracks 22- Median strip in roadway 3-ft. wide. Approximately 1,000 long.

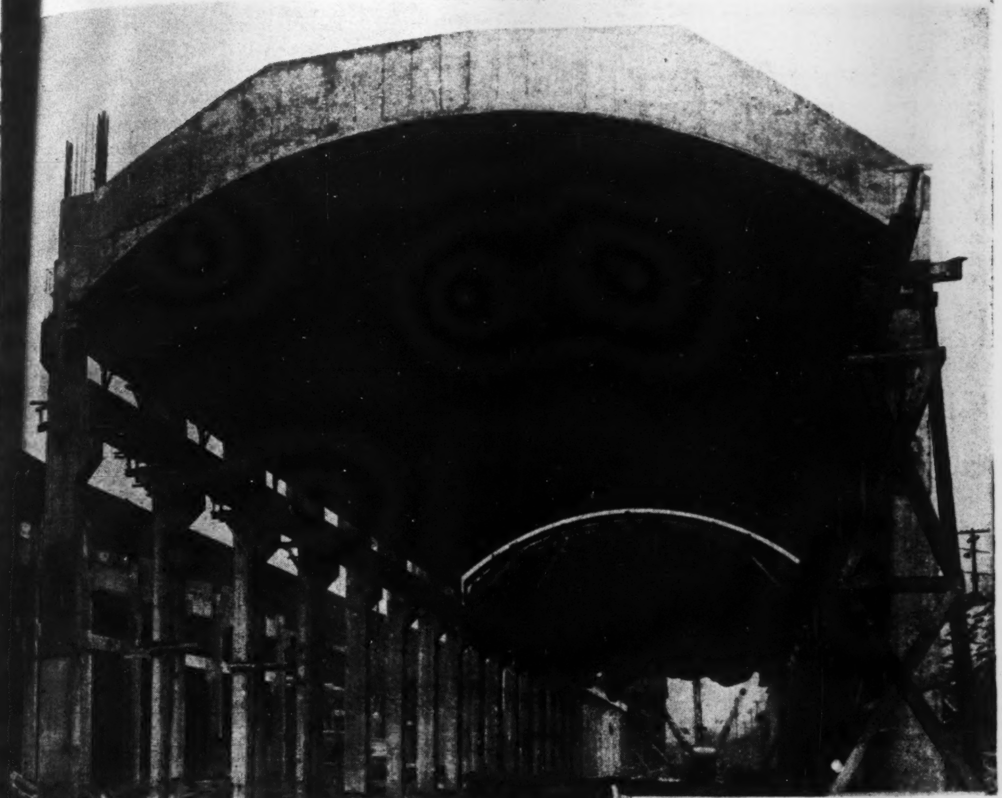
CONDITIONS: Contractor to furnish all materials and com plete work in 150 working days. Rail, highway and wate transportation facilities available, but it is expected that th highway facilities will be most used. Wage rates are: skille labor, $1.35 per hr.; semi-skilled, $1.20; and common, 60c

BIDS: Two bids were opened April 28, 1942, the contract lo of $398,539, and $418,592.

LIST OF BIDDERS:

1. Pocahontas Constr. Co., Lewisburg, W. Va., and Monty Bros., St. Albans, W. Va. (contract)	$398,53
2. Dodd & Archer, Spencer, W. Va., and J. M. Francesa & Co., Fayetteville, W. Va	418,59

Item	Quan.	Unit Prices (1)	(2)
1. Dry excavation	4,670 c. y.	$2.50	$2
2. Class A conc., superstructure	3,076 c. y.	26.00	32
3. Class A conc., substructure	897 c. y.	26.00	30
4. Class B concrete	3,559 c. y.	23.00	25
5. Concrete railing	2,900 l. f.	5.00	5
6. Reinforcing bars	977,975 lb.	.06	
7. Electric welded wire fabric	175 lb.	.10	
8. Bituminous waterproofing	1,275 s. y.	1.50	1
9. Creosoted timber piles	47,840 l. f.	1.90	1
10. Structural steel	L.S.	10,860.00	11,000
11. Cast steel shoes	L.S.	9,000.00	11,000
12. Roadway drainage system	L.S.	2,500.00	4,000
13. Structure excavation	610 c. y.	2.00	2
14. 12-in. rein. conc. pipe	430 l. f.	1.50	2
15. Relaid pipe	332 l. f.	1.00	2
16. Class B concrete	20 c. y.	25.00	25
17. Manhole frame and cover	1 ea.	100.00	100
18. Manholes, except castings	2 ea.	90.00	100
19. Reset manhole, frame and cover	1 ea.	10.00	25
20. Slag macadam base course	720 c. y.	7.00	6
21. Slag prime	30 ton	5.00	12
22. Tar prime	1,620 gal.	.25	
23. Asph. conc. pavement, wearing course	160 ton	15.00	12
24. Subgrade, fine grade and shoulders	3,625 s. y.	.10	
25. Borrow excavation	2,000 c. y.	1.00	1



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BRIDGE AND APPROACHES TENNESSEE

OWNER: Tennessee Department of Highways and Public Works, Nashville.

PROJECT: Construction of reinforced concrete overhead bridge over Nashville, Chattanooga and St. Louis Railroad, Tullahoma, Coffee County, Tenn. Includes plain cement concrete pavement, sidewalks, driveways, curbing, drainage structures, etc., for approaches to bridge.

CONDITIONS: Contractor to furnish all materials and complete work in 200 working days. Rail and highway transportation facilities available. Project has A-1-j preference rating. Minimum wage rates are: skilled labor, 75c. per hour; semi-skilled, 45c.; and common, 30c.

BIDS: Six bids were received September 4, 1942, ranging from the contract low of $287,686 to $355,912.

LIST OF BIDDERS:

1. H. B. Garrett, Ashland, Ala. (contract)	$287,686
2. Foster and Creighton, Nashville, Tenn.	287,799
3. C. A. Thompson, Centerville, Tenn.	302,934
4. V. L. Nicholson Co., Knoxville, Tenn.	323,264
5. A. B. Long, Harriman, Tenn	331,150
6. J. M. Hickman, Harriman, Tenn	355,912

Roadway

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L. S.	$750.00	$150.00	$100.00
2. Road and drainage excav., unclassified	2,303 c. y.	.80	.65	.50
3. Borrow excavation (common)	1,060 c. y.	1.10	.66	1.00
4. Culvert excavation (unclass.)	2,041 c. y.	2.00	1.20	1.50
5. Crushed stone (traf. bd. rdwy.)	50 c. y.	3.00	2.75	3.50
6. Cem. concrete pavement (plain)	5,358 s. y.	3.00	2.96	2.75
7. Class A concrete	28.6 c .y.	30.00	29.00	30.00
8. Class B concrete	1.6 c. y.	30.00	29.00	30.00
9. Brick masonry	19.72 M	60.00	66.00	60.00
10. Concrete sidewalk	6,441 s. f.	.25	.24	.25
11. Concrete driveway	556 s. f.	.50	.33	.35
12. Concrete curb	16.1 c. y.	30.00	22.45	22.00
13. Concrete, combined curb and gutter	72.9 c. y.	30.00	21.15	22.00
14. Treated timber catch basin covers	15 ea.	20.00	16.00	12.00
15. Treated timber manhole covers	9 ea.	20.00	16.00	12.00
16. 18-in. pipe culvert	338 l. f.	2.50	2.05	2.00
17. 24-in. pipe culvert	91 l. f.	3.60	3.40	3.00
18. 30-in. pipe culvert	1,165 l. f.	5.50	4.75	4.75
19. 10-in. vit. clay or non-rein. conc. sewer pipe	63 l. f.	1.00	.90	1.00
20. 12-in. pipe culvert	259 l. f.	1.75	1.60	1.40
21. 15-in. pipe culvert	317 l. f.	1.85	1.70	1.60

Overhead Bridge

Item	Quan.	(1)	(2)	(3)
22. Dry excavation (bridges)	2,345 c. y.	5.00	1.70	2.00
23. Untreated timber	0.553 Mbm.	200.00	155.00	200.00
24. Structural steel	8,471 lb.	.16	.12	.20
25. Steel forgings	13,059 lb.	.24	.18	.22
26. Class S concrete	155.9 c. y.	45.00	53.00	50.00
27. Class A concrete	4,604.1 c. y.	27.50	31.00	34.00
28. Steel bar reinforcement	931,475 lb.	.06	.068	.06
29. Timber test piling (treated)	120 l. f.	4.00	3.45	3.00
30. Treated timber piling, Size 1	2,280 l. f.	2.00	1.00	2.00
31. Concrete test piling	600 l. f.	5.00	4.65	7.00
32. Concrete piling, Size 1	9,600 l. f.	3.10	2.31	3.00
33. 6-in. vitr. clay pipe drains	90 l. f.	1.00	.55	.60
34. 6-in. asbestos cement pipe	290 l. f.	1.50	1.80	1.00
35. Asbestos cement blast boards	482 s. f.	.30	.55	.50
36. Furn. and place all conduits, forming recesses for pullboxes and Niteday Reflectors for barrier curb	L. S.	3,500.00	3,000.00	1,000.00

HIGHWAY BRIDGE CALIFORNIA

OWNER: California Division of Highways, Sacramento. C. H. Purcell, State Highway Engineer.

PROJECT: Construction of a timber, steel and concrete bridge across the Albion River at Albion, Mendocino County, Calif. Length approximately 969 feet. Involves dismantling steel bridge on Feather River and using salvaged materials and re-assembling at the new location.

CONDITIONS: State will furnish railroad rail for reinforci and salvaged structural steel for erection of steel span. C tractor to furnish all other materials and complete work in 2 days. Rail and highway transportation facilities availab Project has priority rating of A-2. Wage rates are: skill labor, $1.00 to $1.75 per hour; semi-skilled, 80c. to $1.2 and common, 62½c. to 75c.

BIDS: Four bids were received September 16, 1942, rangi from the contract low of $345,528 to $391,430.

LIST OF BIDDERS:

1. Fred J. Maurer & Son, San Francisco, Calif. (contract)	$345,5
2. J. H. Pomeroy & Co., Inc., San Francisco, Calif. (bid irregular)	371,3
3. Trewhitt-Shields & Fisher, Fresno, Calif	390,8
4. E. E. Smith, El Cerrito, Calif	391,

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L. S.	$4,000.00	$5,500.00	$3,500.
2. Remove and salvage exist. steel bridge across Feather River	L. S.	15,000.00	9,500.00	30,000.
3. Structural excavation, type A	800 c. y.	10.00	6.00	18.
4. Structural excavation, type B	2,400 c. y.	6.00	10.00	5.
5. Rock and screenings (bit. surf. trtmt.)	305 ton	10.00	8.00	7.
6. Liquid asphalt, SC-6	16 ton	35.00	90.00	40.
7. Redwood timber	818 M bm.	205.00	205.00	198.
8. Class A plain cement concrete (footing blk.)	320 c. y.	30.00	30.00	25.
9. Class A plain cement concrete (towers)	450 c. y.	70.00	80.00	61.
10. Class A plain cement concrete (struct.)	1,110 c. y.	35.00	40.00	38.
11. Erect. salvaged struct. steel	137,000 lb.	.10	.07	[illegible]
12. Furnish timber piles	9,760 l. f.	.30	.55	[illegible]
13. Drive timber piles	244 ea.	30.00	90.00	125.
14. Furn. precast conc. piles, incl. test piles	960 l. f.	3.00	5.00	5.
15. Drive precast conc. piles, incl. test piles	48 ea.	100.00	100.00	125.
16. Railroad rail straps	2,900 l. f.	.50	.25	.75
17. Splitting railroad rails	7,100 l. f.	.50	1.00	.50
18. Place railroad rail reinforcing	145,000 l. f.	.03	.03	.04
19. Bar reinforcing steel	34,000 lb.	.10	.03	.07
20. Mesh reinforcing	250 s. y.	2.00	1.00	.50
21. Misc. items of work	L. S.	8,000.00	6,000.00	1,500.00

BRIDGE SUBSTRUCTURE NEW JERSEY

OWNER: New Jersey State Highway Dept., Trenton. Morris Goodkind, bridge engineer.

PROJECT: Substructure of bridge over tracks of New York & Long Branch Railroad, on Route 35, Borough of Sayreville, Middlesex County, N. J. Includes all foundation excavation, concrete in structures (abutments) and balustrade; timber piling; cinder backfill; concrete cribbing; borrow excavation; rock fill (crib wall); reinforcing steel; waterproofing; and clearing site.

CONDITIONS: Contractor to furnish all materials and complete work in 75 working days. Rail and highway transportation facilities available. Wage rates are those prevailing in Middlesex County.

BIDS: Four bids were received December 28, 1942, ranging from the low of $108,607 to $121,484.

1. Fehlhaber Pile Co., New York, N. Y. (low bidder)	$108,607
2. Ell-Dorer Contracting Co., Irvington, N. J.	117,566
3. H. L. Harrison & Son, Inc., Newark, N. J.	120,601
4. Franklin Contracting Co., Newark, N. J.	121,484

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Foundation excavation	2,350 c. y.	$11.00	$7.95	$10.00
2. Relocate existing stariways	Lump Sum	300.00	500.00	500.00
3. Timber piles	9,600 l. f.	.40	1.20	.85
4. Class C concrete (structures)	3,165 c. y.	18.00	19.60	19.50
5. Concrete balustrade	59 l. f.	7.00	6.00	10.00
6. Cinder backfill	3,030 c. y.	2.00	2.25	2.00
7. Concrete cribbing	3,122 c. f.	1.75	2.50	2.50
8. Borrow excavation	2,740 c. y.	1.00	1.50	1.25
9. Rock fill, crib wall	550 c. y.	7.00	3.00	4.50
10. Reinforcing steel (structures)	9,620 lb.	.10	.10	.10
11. Waterproofing	627 s. f.	.50	.50	.50
12. Foundation excavation, crib wall	1,545 c. y.	1.00	1.50	2.50
13. Clearing site	Lump Sum	300.00	500.00	1,230.00

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BRIDGE AND APPROACHES
GEORGIA

OWNER: Georgia State Highway Department.

PROJECT: Reinforced concrete bridge over the Darien River with 0.258 miles of grading and approach fills on the Brunswick-Darien Road, McIntosh County, Ga. Bridge length is 1,452.5 feet; height, 76 feet from bottom of footings; and width 44-ft.

CONDITIONS: Contractor to furnish all materials and complete work in 240 working days. Rail, highway and water transportation facilities available. Wage rates specified are: skilled labor, 60c. per hour; semi-skilled 40c.; and common labor 30c.

BIDS: Four bids were received November 10, 1942, ranging from the contract low of $989,509 to $1,148,464.

LIST OF BIDDERS:

1. Scott Constr. Co., Thomasville, Ga. (contract)	$989,509
2. Espy Paving Co., Savannah, Ga	1,051,649
3. C. Y. Thomason Co. and McMeekin Constr Co., Savannah, Ga.	1,086,882
4. Coffee Constr. Co., Eastman, Ga	1,148,464

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	Lump Sum	$1,200.00	$1,000.00	$1,250.00
2. Muck excavation (No. 1)	38,510 c. y.	1.00	1.00	1.00
3. Muck excavation (No. 2)	2,628 c. y.	2.00	1.50	1.00
4. Hydraulic embankment	61,640 c. y.	.60	1.00	.80
5. Embankment placed in 6-in. layers	10,484 c. y.	1.00	1.50	1.00
6. Provide detour bridge	1,300 l. f.	45.00	45.00	35.00
7. Sand asphalt road-mix, incl. 4 tons cutback asph	4 ton	25.00	9.00	12.00
8. Common and borrow excav. for detour	700 c. y.	1.00	1.00	1.00
9. Sprigging	2,500 s. y.	.05	.04	.15
10. Remove timber bridge	Lump Sum	500.00	200.00	1,000.00
11. Class A concrete (substr.)	3,350 c. y.	45.00	40.00	43.00
12. Class A conc. deposited in water	4,000 c. y.	50.00	45.00	40.00
13. Bar reinforcing steel	350,000 lb.	.06	.06	.07
14. Excavation (No. 1)	10,100 c. y.	15.00	15.00	20.00
15. Excavation (No. 2)	1,200 c. y.	20.00	15.00	20.00
16. Timber piling, untreated	570,000 l. f.	.80	1.25	1.75
17. Timber piling, treated (16-lb.)	4,600 l. f.	2.00	1.50	2.40
18. Channel excavation	10,000 c. y.	1.00	1.00	2.00
19. Treated bridge timber (16-lb.)	10.5 Mbm.	200.00	200.00	250.00
20. Clearing and grubbing	Lump Sum	1,200.00	500.00	1,300.00
21. Remove existing bridge	Lump Sum	10,000.00	20,000.00	8,000.00
22. Plain stone riprap	1,000 s. y.	2.50	2.50	3.50
23. Timber test piles	10 ea.	200.00	175.00	150.00
24. Concrete precast piles	1,500 l. f.	6.00	10.00	6.00
25. Concrete test piles	2 ea.	400.00	250.00	450.00
26. Class A conc., superstr., Bent 1 to pier 23 and pier 27 to bent 3	2,275 c. y.	40.00	42.00	45.00
27. Cl. A conc., superstr., pier 23 to pier 27	575 c. y.	40.00	42.00	50.00
28. Bar reinforcing steel	698,000 lb.	.06	.06	.07
29. Concrete handrail	2,905 l. f.	4.00	3.00	5.00
30. Painting struct. steel	Lump Sum	5,000.00	5,000.00	5,400.00
31. Remove detour bridge	Lump Sum	5,000.00	40,000.00	2,500.00

HIGHWAY BRIDGES, MARYLAND

OWNER: State Roads Commission of Maryland, Baltimore.

PROJECT: Construction of dual overcrossing structures and concrete surfacing 1.293 miles of roadway near Cranberry Run on Philadelphia Road toward Boothby Hill, in Harford County, Md. The dual bridge for dual highway is steel I-beam structure with concrete floor, and concrete substructure. Each bridge includes three spans, two of which are 52½-ft. and one 71-ft. Roadway width of each is 28-ft., and each includes two sidewalks, one 3-ft. wide, and the other 4-ft. Contract includes highway approaches and an additional bridge over U. S. Highway No. 40.

CONDITIONS: Contractor to furnish all materials and complete work in 142 working days. Rail and highway transportation facilities available. Minimum wage rates specified are: skilled labor, 70c. per hour; semi-skilled, 55c.; and common, 40c. Approximate contract cost of dual bridges over Pennsylvania Railroad is $145,000.

BIDS: Three bids were opened July 28, 1942, ranging from the contract low of $597,541 to $609,220.

LIST OF BIDDERS:

1. Frank Carozza, Baltimore, Md. (contract)
2. H. R. Miller Co., Lancaster, Pa.
3. C. J. Langenfelder & Son, Rosedale, Md.

Item	Quan.	Unit Prices (1)	(2)
1. Clearing and grubbing	L.S.	$14,000.00	$5,000.00
2. Class No. 1 excavation	12,500 c. y.	.60	.50
3. Class No. 2 excavation	2,600 c. y.	4.00	5.00
4. Class No. 5 excavation	700 c. y.	1.50	3.00
5. Borrow excavation	263,500 c. y.	.70	.60
6. Tamped fill	2,400 c. y.	1.50	2.00
7. Earth shoulders	3,950 s. y.	.15	.40
8. Seeding park area	116 M s. f.	10.00	6.00
9. Furn. and place topsoil	13,000 s. y.	.40	.60
10. Sodding	4,100 s. y.	.40	1.25
11. Trim exist. ditches	500 l. f.	.20	.60
12. Remove exist. pavmt., sidewalk, curb, and comb. curb and gutter	50 c. y.	8.00	6.00
13. Remove existing masonry	5 c. y.	8.00	6.00
14. Stabilized base course	425 ton	3.00	4.00
15. Calcium chloride	18 ton	40.00	40.00
16. Sub-base	350 c. y.	3.00	4.00
17. Stabilized shoulders (screenings)	8,900 s. y.	.50	.50
18. 10x8-in. plain. cem. conc. pavmt. (A reg.)	31,600 s. y.	3.60	3.50
19. 10x8-in. plain. cem. conc. pavmt. (X ES)	1,400 s. y.	4.00	3.90
20. 9-in. plain. cem. conc. pavmt. (A reg.)	2,300 s. y.	4.00	3.60
21. 9-in. plain. cem. conc. pavmt. (X ES)	1,050 s. y.	4.50	4.00
22. Aggregate for underdrain	10 c. y.	4.00	5.00
23. 6-in. conc. pipe underdrain outlets	50 l. f.	.80	3.00
24. 6-in. perf. conc. pipe underdrain	100 l. f.	.80	3.00
25. 15-in. rein. concrete pipe	1,627 l. f.	2.00	3.00
26. 18-in. rein. concrete pipe	629 l. f.	3.00	3.50
27. 24-in. rein. concrete pipe	255 l. f.	4.00	4.75
28. Remove old pipe culverts	200 l. f.	1.00	3.00
29. Relay old pipe culverts	200 l. f.	2.00	3.00
30. 15-in. 90-deg. conc. pipe elbow	4 ea.	15.00	25.00
31. 15-in. 30-deg. conc. pipe elbow	4 ea.	15.00	25.00
32. 15x15-in. rein. conc. pipe tee section	1 ea.	20.00	30.00
33. 15x18-in. rein. conc. pipe tee section	3 ea.	25.00	35.00
34. Treated timber, Class A timber piles	3,300 l. f.	3.50	3.50
35. Timber test piles	100 l. f.	3.50	5.00
36. Test piles (railroad bridge)	80 l. f.	6.00	6.00
37. Cast-in-place concrete piles	2,100 l. f.	6.00	6.00
38. Class A conc. pipe endwalls (A reg.)	50 c. y.	40.00	55.00
39. Class A concrete (A reg.)	1,800 c. y.	40.00	46.00
40. Class B concrete (B reg.)	325 c. y.	35.00	35.00
41. Reinforcing steel bars	223,700 lb.	.06	.07
42. Plain structural steel	64,600 lb.	.07	.075
43. Fabricated structural steel	554,000 lb.	.07	.09
44. Wrought iron blast plates, etc.	2,840 lb.	.20	.30
45. Plywood facing	L.S.	2,000.00	4,000.00
46. Treated timber	92 Mbm.	200.00	190.00
47. Untreated timber	18 Mbm.	250.00	225.00
48. Damp-proofing (Sta. 27+)	L.S.	500.00	200.00
49. Drainage system	L.S.	2,000.00	400.00
50. Furnish and install conduits	L.S.	1,000.00	2,000.00
51. Expansion material in bridge (Sta. 0+00)	L.S.	1,000.00	900.00
52. Expan. material in bridge (Sta. 27+)	L.S.	2,000.00	300.00
53. 5-in. plain. cem. conc. gutter (A reg.)	200 s. y.	4.00	3.25
54. 8-in. plain cem. conc. gutter (A reg.)	25 s. y.	5.00	5.00
55. Comb. cem. conc. curb and gutter (A reg.)	6,200 l. f.	2.00	2.25
56. 8x22-in. plain cem. conc. curb (A reg.)	1,000 l. f.	1.50	2.00
57. Integral cem. conc. curb	600 l. f.	3.00	2.00
58. White cem. conc. curb separator (A reg. and white)	100 l. f.	4.00	5.00
59. Guard rail posts	452 ea.	5.00	5.00
60. Cedar posts	64 ea.	5.00	6.00
61. Maintenance of traffic	L.S.	1,000.00	4,500.00
62. Manhole	1 ea.	250.00	250.00
63. Type H combination inlets	11 ea.	250.00	250.00

BRIDGE, GEORGIA

OWNER: Georgia State Highway Department, Atlanta; W. E. Wilburn, chairman.

PROJECT: Construction of reinforced concrete bridge over the Chattahoochee River in Fulton and Cobb Counties, Ga. on the Atlanta-Marietta Road. Length of project 701 feet; roadway width 26-ft., with 5-ft. concrete sidewalk on one side. Height above normal water level is 40-ft.

CONDITIONS: Contractor to furnish all materials and complete work by December 1, 1942. Railway transportation facilities available three miles from site of work, and highway at the project. Wage rate minimums are: skilled labor, 50c. per hour; semi-skilled, 40c; and common, 30c.

BIDS: Five bids were received July 3, 1942, ranging from the contract low of $201,466 to $239,958.

LIST OF BIDDERS:

1. G. L. Strickler, Austell, Ga. (contract)	$201,466
2. W. B. Brantley Constr. Co., Atlanta, Ga.	206,477

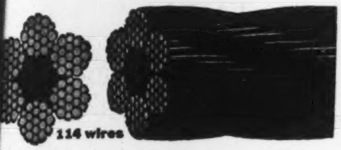
A Short Breaking-in Period Extends Wire Rope Life

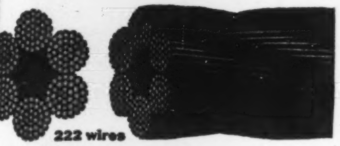
his is Number 14 of a series of informative icles on how to get the most out of wire e. It is directed to those who want to do rything they can to lengthen wire rope life d conserve steel. Other articles in the series e available on request.}

* * *

Cooperation in the present emergency a vital necessity to success. It is a basic ndamental without which wars cannot e won, freedom cannot be maintained.

Cooperation within a piece of wire rope just as essential to its success, but, being re rope, it needs our help to do its job.





here are 114 or more wires in the average ire rope. They need to cooperate together y each carrying their share of the load. llustrated above are two standard ropes howing number of wires in each.

The process of manufacture lays these ires into a rope and manufacturers ship his rope to you prepared to do its task.

The rope's success depends a great deal on how it becomes adapted to the equipment and to the work it must do.

WHAT "BREAKING IN" MEANS

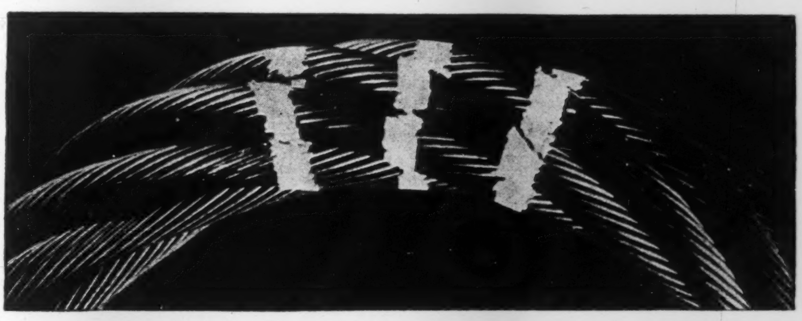
For example, we all know that the life of a book depends upon proper handling at the start. To simply grab a book and pop it open injures the binding, but by gradually and carefully opening the book at different points, it becomes "broken in" and its life is greatly extended.

Wire rope is a complex machine that has many wires, like a book has many pages. When the rope is put into use, a little care in handling and operating it at first, pays dividends later. Haste makes waste, which you want to avoid.

The breaking-in period gives the rope a chance to adapt itself to the track or path in which it must travel. It becomes accustomed to the arc of bending, becomes comfortably seated in the groove and assures the operator, after a short "trial run," that it is ready to go to work safely.

"BUT WE CAN'T TAKE THE TIME TODAY!"

The actual time taken to properly break in a rope is a small percentage of the time it takes to install a rope. If you must replace rope often and you can cut down the number of replacements by extending rope life, you will be conserving steel, reducing costs, and actually saving time.



BENDING DOES THIS

To get the picture (above) three white stripes were painted around a 5/8" 6x37 PREformed wire rope before bending. Then the wire rope was flexed by hand and this picture taken. Notice how the paint cracked up and separated, caused by the movement of the wires and strands to make the bend. Getting the rope accustomed to this flexing and wire and strand movement is a job of breaking in.

"WHAT SHALL WE DO?"

First, as has been explained in previous articles of this series, the equipment should be in good repair.

Second, as explained in article 9 of this series, the rope should be unwound from the reel or coil so as to avoid twisting and kinking.

Third, the rope should be firmly attached to the equipment, taking care to seize it with wire to prevent it untwisting.

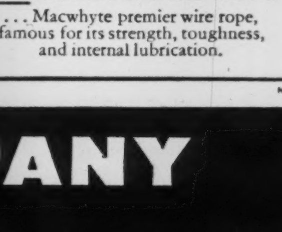
Fourth, after rope is attached and reeved around sheaves and drums, operate it without load a few times, until you see that it is flexing easily over sheaves and winding correctly on the drum.

Fifth, gradually increase the speed and load until the rope is operating up to its normal loading and speed.

WHAT ABOUT PRE-FORMED ROPE?

During the manufacture of the rope, the process of PREforming adjusts the wires and strands into the helical shape they take in the rope. This is often called a "breaking-in" process that helps prepare the rope for quick use and therefore it should not require as much "breaking in" on the job.

However, whether PREformed or nonpreformed, it pays to handle the rope carefully and give it a chance to get accustomed to the operation of the equipment.



MONARCH Whyte Strand PRE-FORMED WIRE ROPE

. . . Macwhyte premier wire rope, famous for its strength, toughness, and internal lubrication.

NO. 666

MACWHYTE COMPANY

WIRE ROPE

2930 FOURTEENTH AVENUE KENOSHA, WISCONSIN

Manufacturers of MACWHYTE PREformed and Internally Lubricated Wire Rope MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable MACWHYTE Braided Wire Rope Slings MACWHYTE Aircraft Cables and Tie-Rods

3. H. G. Smith, Fitzgerald, Ga. 210,906
4. Southeastern Engineering Co., Atlanta, Ga. 229,566
5. S. B. Slack, Decatur, Ga. 239,958

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Class A concrete	3,200 c. y.	$40.00	$38.75	$34.00
2. Bar reinforcing steel	282,000 lb.	.065	.07	.07
3. Structural steel	L.S.	2,000.00	2,500.00	2,000.00
4. Excavation, No. 1	3,700 c. y.	10.00	12.00	17.00
5. Excavation, No. 2	400 c. y.	2.50	7.00	20.00
6. Concrete handrail	1,404 l. f.	4.00	3.50	1.50
7. Clearing and grubbing (3.222 ac.)	L.S.	2,000.00	1,000.00	700.00
8. Excavation	1,000 c. y.	1.00	.75	1.00

BRIDGE, KENTUCKY

OWNER: Kentucky Department of Highways, Frankfort.

PROJECT: Construction of concrete overhead bridge on Fort Knox-Brandenburg Station Road, Hardin County, Ky. Spans Illinois Central Railroad tracks and old U. S. Highway 31-W. Involves erection of three 50-ft. and one 173-ft. continuous concrete girder spans. Length, 332-ft.; height, 24-ft. clear; and width of roadway, 26-ft.

CONDITIONS: Contractor to furnish all materials and complete work by June 16, 1943. Rail facilities available via Illinois Central at site of work; highway transportation on U. S. Highways 31-W and 60 also at site; and water transportation available to West Point, Ky., on the Ohio River. Wage rates specified are: skilled labor, $1.25 to $1.50 per hour; semi-skilled, 70c. to $1.25; and common labor, 67½c.

BIDS: Six bids were received August 14, 1942, ranging from the contract low of $106.389 to $119,592. Awarded August 18th.

LIST OF BIDDERS:

1. Nally & Mudd, Springfield, Ky. (contract) $106,389
2. Harry O. Wyse, Frankfort, Ky 109,611
3. Lyons & Breeden, Rogersville, Tenn 111,578
4. Tye and Wells, Carrollton, Ky 114,376
5. George M. Eady Co., Louisville, Ky 119,090
6. R. R. Dawson, Bloomfield, Ky 119,592

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Class A concrete	747.6 c. y.	$26.00	$30.00	$28.00
2. Class B concrete	3,056.0 c. y.	21.90	21.00	23.00
3. Class D concrete	33.2 c. y.	60.00	70.00	70.00
4. Steel reinforcement	212,220 lb.	.06	.06	.06
5. Structure excavation, common	2,650 c. y.	2.00	3.00	2.00

BRIDGE, NORTH CAROLINA

OWNER: North Carolina State Highway and Public Works Commission, Raleigh.

PROJECT: Construction of bridge over New River on North Carolina Route 172, Onslow County, N. C. Structure is swing span riveted, center bearing, steel truss, with balancing wheels and tracks; full circular rack, center and end wedges. Span: length 168-ft.; height 28-ft.

CONDITIONS: Contractor to furnish all materials and complete work in 175 days. Rail and highway transportation facilities available. Wage rates specified as minimums are: skilled labor, 55c. per hr.; semi-skilled, 35c.; common, 30c.

LIST OF BIDDERS: Bids opened May 14, 1942.

1. R. H. Small, Charlotte, N. C. (contract) $288,630
2. F. A. Triplett, Chester, S. C 294,009
3. Wannamaker & Wells, Inc., Orangeburg, S. C 336,489

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Removal of exist. structures	L.S.	$5,500.00	$8,000.00	$8,000.00
2 Class A concrete	1,707 c.y.	37.50	35.00	45.00
3. Reinforcing steel	715,860 lb.	.0575	.06	.064
4. Struct. steel (303,000 lb.)	L.S.	31,500.00	33,936.00	34,700.00

5. Creosoted struct. timber	84 Mbm.	178.00	200.00	200
6. Creosoted timber piles	10,200 l.f.	1.65	1.45	1
7. 20-in. precast conc. piles	5,970 l.f.	5.80	6.60	7
8. 22-in. precast conc. piles	4,410 l.f.	6.50	6.75	7
9. Test piles (unloaded timber) for determining length of conc. piles	5 ea.	500.00	400.00	450
10. Test piles (unloaded timber) for determining length of timber piles	2 ea.	250.00	100.00	150
11. Mineral surf. asph. plank wear. surf.	479 s.y.	3.20	3.00	4
12. Operator's house	L.S.	800.00	1,400.00	1,250
13. Electrical equipment	L.S.	12,050.00	12,980.00	15,400
14. Safety gates (4)	L.S.	2,000.00	1,800.00	2,400
15. Machinery (48,000 lb.)	L.S.	32,000.00	28,800.00	35,408

BRIDGE IMPROVEMENTS, OKLAHOMA

OWNER: Oklahoma State Highway Department. Oklahom City.

PROJECT: Concrete paving and channel changes at bridg over Bird Creek, north of Tulsa, Tulsa County, Okla. Include 0.134 miles of 22-ft. plain cement concrete paving (9-7-9-in.) and improvement of 700 by 200-ft. channel area.

CONDITIONS: Contractor to furnish all materials and complete work in three months. Rail and highway transportatio facilities available. Wage rates are: skilled labor. $1.00 pe hour; semi-skilled, 60c.; and common, 40c.

BIDS: Two bids were opened June 16, 1942, the contract lo of $57,403, and $57,438.

LIST OF BIDDERS:

1. J. Briscoe, Stillwater, Okla (contract) $57,403
2. Ottinger Bros. Co., Hinton, Okla 57,438

Item	Quan.	Unit-Prices (1)	(2)
1. Class D excavation	120,616 c.y.	$0.42	$0.42
2. Rolling	157 hr.	2.00	3.00
3. Sprinkling	353.43 M gal.	1.50	1.25
4. Overhaul	12,000 sec.y.	.03	.04
5. Shoulders	0.134 mi.	400.00	300.00
6. Plain cem. conc. pavmt. (9-7-9-in.)	1,421.4 s.y.	3.00	2.85
7. Plain riprap	240 c.y	3.50	3.00
8. Remove concrete pavement	1,233.4 s.y.	.30	.45
9. Right-of-way markers	4 ea.	3.00	5.00

BRIDGE, MARYLAND

OWNER: State Roads Commission of Maryland, Baltimore.

PROJECT: Construction of bridge, steel I-beam on precast concrete pile bents, over Back River on Eastern Ave., near Essex, Md. Total length, 1,500-ft.; Roadway width, 55-ft.

CONDITIONS: Contractor to furnish all materials and complete bridge ready for traffic by December 1, 1942. Minimum wage rates specified are: skilled labor, 70c. per hr.; semi-skilled, 55c.; and common, 40c.

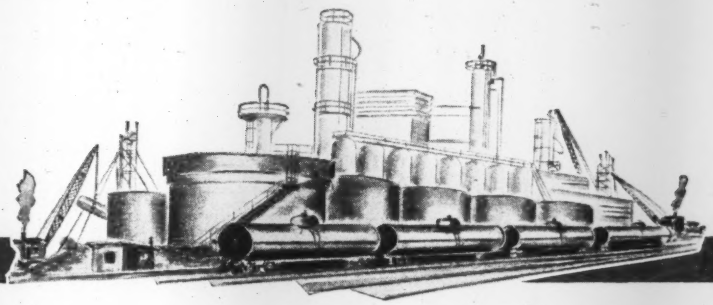
LIST OF BIDDERS: (Bids opened February 24, 1942.)

1. Melwood Constr. Corp., New York, N. Y. (contract) $722,910
2. Kaufman Constr. Co., Philadelphia, Pa. 745,641
3. Empire Constr. Co., Baltimore, Md. 795,082

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Class 2 excavation	330 c. y.	$3.00	$5.00	$2.45
2. Class 3 excavation	200 c. y.	10.00	12.00	14.00
3. Class 4 excavation	195 c. y.	50.00	12.00	15.00
4. Class 5 excavation	625 c. y.	3.00	12.00	4.40
5. Foundation load tests	3 ea.	300.00	500.00	500.00
6. Concrete test piles	300 l. f.	4.00	5.00	11.60
7. Load tests for conc. piles	3 ea.	500.00	500.00	680.00
8. Damp-proofing	L. S.	500.00	500.00	500.00
9. Precast concrete piles	20,000 l. f.	8.10	9.00	13.60
10. Protection coat for precast conc. piles	L. S.	10,000.00	5,000.00	13,500.00
11. Untr. Cl. B timber piles	2,300 l. f.	3.00	2.00	2.35
12. Class A concrete	3,641 c. y.	40.00	46.00	32.50
13. Reinforcing steel bars	582,000 lb.	.09	.06	.067
14. Fabr. structural steel	3,293,000 lb.	.07	.08	.0691
15. Median strip	1,490 l. f.	5.00	6.00	5.10
16. 16-in. water main	1,495 l. f.	25.00	20.00	31.25
17. 14-in. sewer force main	1,495 l. f.	12.00	7.00	13.40
18. Installation of telephone conduit.	L. S.	4,000.00	2,000.00	1,150.00
19. Removal of exist high bridge	L. S.	30,000.00	20,000.00	27,000.00

Building for Victory

and Beyond!



Graver Construction Division is building for Victory — and for the years of peace which are to follow. Of particular importance is the job of modernizing plants for the production of 100 octane gasoline. This vital fuel — so essential in war — will be equally important in peace, and these plants — built for years of service — will continue to play an important part in the great program of world rehabilitation.

Graver Construction Division offers to the oil, rubber, steel, and process industries, a service capable of handling any job, large or small, and backed by experience, modern equipment, and trained personnel. While engineering and designing are not included, this service provides for complete construction and erection together with the fabrication, by our manufacturing division, of such equipment as may be desired.

Whether you are planning for today or the future, consult Graver. There's no obligation.

Pipe Line Terminals
•
Pipe Line Pumping Stations
•
Complete Refineries
•
Refinery Units
•
Auxiliaries to all Types of Refinery Equipment

GRAVER

Industrial Construction and Erection

Auxiliary Equipment for Synthetic Rubber Plants
•
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•
Chemical Plants
•
Piping
•
Process Equipment Dismantled and Re-erected

GRAVER TANK & MFG. CO., INC.

4811–55 Tod Ave.

NEW YORK
CATASAUQUA, PA.
EAST CHICAGO, IND.
CABLE ADDRESS — GRATANK
CHICAGO
TULSA

GRADE CROSSING ELIMINATION
FRANKLIN COUNTY, OHIO

OWNER: State of Ohio, Dept. of Highways, Columbus, Ohio.

PROJECT: Grade crossing elimination project in Franklin County, Ohio—overall length 2.243 miles, including roadways and approaches. Involves construction of 394-ft. reinforced concrete and steel bridge over Baltimore & Ohio, Pennsylvania, and New York Central Railroad tracks; 77-ft. bridge (rigid frame structure) over Fifth Avenue; roadway culverts; 8-in. portland cement concrete pavement; excavation; drainage structures; roadside improvement; and appurtenant work. Pavement width varies, 26-ft., 24-ft., and 18-ft.

CONDITIONS: Contractor to furnish all materials and complete work by December 31, 1943. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.15 to $1.75 per hr.; semi-skilled, 75c to $1.375; and common, 75c.

BIDS: Four bids were received December 22, 1942, ranging from the contract low of $540,000 to $643,649. Engineer's estimate, $656,220.

LIST OF BIDDERS:

1. Visintine & Co., Columbus, Ohio (contract)	$540,000
2. Skilken Brothers, Columbus, Ohio	621,002
3. John Hill, Mansfield, Ohio	638,904
4. National Engineering & Contracting Co., Cleveland, Ohio	643,649

Roadway

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Unclassified roadway excavation	21,188 c. y.	$0.75	$1.01	$0.65
2. Borrow (contractor to furnish)	156,059 c. y.	.60	.82	.95
3. Remove and dispose exist. conc. pavmt	36 s. y.	.50	1.25	1.00
4. Remove, dispose of exist. bitum. pavmt	1,352 s. y.	.20	.78	.25
5. Remove, dispose of exist. wearing crse	664 s. y.	.20	.70	.25
6. Remove trees and stumps	70 ea.	10.00	18.90	25.00
7. Cut and seal exist. pavmt. edge	2,818 l. f.	.10	.37	.25
8. Seal existing pavement edge	2,054 l. f.	.07	.09	.05
9. Water (estimated)	751 M gal.	2.00	3.27	7.00
10. 12-in. plain cem. conc. pipe (driveways)	170 l. f.	1.50	1.64	2.75
11. 10-in. p. c. c. pipe (storm sewers under pavmt.)	76 l. f.	1.20	1.76	2.40
12. 24-in., as above	80 l. f.	4.00	5.04	6.00
13. 24-in. p. c. c. pipe (for storm sewers)	468 l. f.	4.00	5.04	5.50
14. 15-in., as above	391 l. f.	1.80	2.15	3.15
15. 12-in., as above	1,580 l. f.	1.50	1.64	2.50
16. 6-in. p. c. c. pipe (storm sew. under pavmt.)	32 l. f.	1.15	1.25	1.50
17. 8-in., as above	96 l. f.	1.25	1.52	2.25
18. 12-in., as above	1,256 l. f.	1.50	1.89	3.00
19. 15-in., as above	130 l. f.	1.80	2.14	1.40
20. 18-in., as above	144 l. f.	2.50	2.90	4.50
21. 21-in., as above	176 l. f.	3.00	3.40	5.25
22. 12-in. ext. qual. drain tile (roadway drainage with porous backfill)	570 l. f.	1.60	1.33	2.60
23. 21-in. pl. cem. conc. pipe (rdwy. drainage)	11 l. f.	3.00	7.82	5.00
24. 6-in. ext. qual. drain tile (drainage, rdwy.)	448 l. f.	1.15	.68	1.70
25. 8-in., as above	98 l. f.	1.50	1.00	2.25
26. 8-in. ext. qual. drain tile (rdwy. drainage with porous backfill)	753 l. f.	1.20	1.07	2.25
27. 10-in. ext. qual. drain tile (rdwy. drainage)	52 l. f.	1.75	1.50	2.40
28. 12-in., as above	192 l. f.	1.75	1.21	2.50
29. 15-in. pl. cem. conc. pipe (rdwy. drainage)	9 l. f.	2.00	7.00	3.10
30. 18-in. pl. cem. conc. pipe (storm sewers)	1,154 l. f.	3.00	3.65	4.10
31. 4-in. ext. qual. drain tile (underdrains)	4,287 l. f.	.60	.55	1.00
32. 21x8-in. tee pipe spec. (st. sewers under pavement)	1 ea.	5.00	5.00	10.00
33. 10-in. pipe specials (under pavement)	2 ea.	5.00	5.00	10.00
34. 30-deg. 21-in. L pipe spec. (rdwy. drainage)	1 ea.	22.50	9.00	25.00
35. Relay 6-in. pipe for roadway drainage	130 l. f.	.50	1.45	1.40
36. Standard No. 1 manholes	2 ea.	125.00	145.00	125.00
37. Standard No. 16 catch basins	32 ea.	140.00	166.00	160.00
38. Std. No. 1–3 catch basins (modified)	2 ea.	45.00	150.00	150.00
39. Std. No. 7 catch basins with wood tops	3 ea.	50.00	145.00	100.00
40. Std. No. 1–2–A catch basins	9 ea.	50.00	103.00	125.00
41. Std. No. 11–A catch basins (mod. casting)	3 ea.	110.00	222.00	200.00
42. Std. No. 2–2–A catch basins (no side inlets)	6 ea.	45.00	113.00	125.00
43. Reset manhole castings to grade	8 ea.	10.00	63.00	25.00
44. Type A riprap	27 s. y.	4.00	8.40	6.00
45. 4-in. concrete sidewalks	4,971 s. f.	.25	.26	.35
46. Remove and store guardrail	368 l. f.	.50	.63	
47. Aggregate for traffic bound side appr. (60% No. 4: 40% No. 7)	68 c. y.	3.00	3.34	
48. Classified embankment (blanket course)	5,466 c. y.	1.25	1.51	
49. Remove, dispose exist. conc. curb	2,257 l. f.	.20	.25	
50. Remove, dispose exist. conc. sidewalk	8,813 s. f.	.03	.06	
51. Remove, dispose exist. steps (11 units)	Lump Sum	55.00	76.00	
52. Remove, dispose of pipe (to 15-in. dia.)	162 l. f.	.50	1.00	
53. As above, over 15-in. dia	3 l. f.	1.00	1.30	
54. 6-in. pipe removed for re-use	130 l. f.	.50	1.00	
55. Remove, dispose exist. curb and gutter	222 l. f.	.50	.32	
56. 21-in. pl. cem. conc. pipe (storm sewers)	1,290 l. f.	3.25	3.40	
57. 12-in. p. c. c. pipe (rdwy. drainage outlets)	40 l. f.	1.50	3.65	
58. Exist. catch basins, manholes, inlets abandoned	15 ea.	10.00	4.00	
59. Conc. steps, 6-in. riser, 12-in. treads	236 l. f.	1.50	1.58	
60. Wood guard rail posts	645 ea.	2.50	4.28	
61. Monodirectional markers, Dickson Model B (clear glass) or equal	262 ea.	1.00	2.20	
62. Aggregate for maintaining traffic	125 c. y.	2.00	3.34	
63. Calcium chloride, del'd. and applied	2.5 ton	40.00	57.00	
64. One drilled well abandoned	Lump Sum	25.00	32.00	

Pavement

Item	Quan.	Unit Prices (1)	(2)	(3)
65. 2-in. insulation course	1,933 s. y.	.25	.59	.15
66. Waterbound macadam base course, coarse aggregate	1,395 ton	3.00	2.71	4.00
67. As above, fine aggregate	511 ton	3.00	2.71	5.00
68. Furn. and incorporating black coloring in concrete	1,217.5 s. y.	.20	.25	.25
69. Asph. conc. surface course, Type A	73 c. y.	11.00	7.56	12.00
70. Bitum. surf. treatment, No. 6 aggr.	34 ton	3.00	2.41	3.25
71. Bitum. surf. trtmt. (seal coat)	1,011 gal.	.11	.28	.20
72. Asphaltic conc. leveling course	58 c. y.	11.00	7.50	12.00
73. Bituminous prime coat	2,092 gal.	.11	.28	.20
74. Bitum. surf. trtmt., bitum. material	2,427 gal.	.11	.28	.20
75. Bitum. surf. trtmt., cover aggr. No. 46	89 ton	3.00	2.39	3.25
76. Portland cem. conc. pavmt., for drives (6-in.)	211.4 s. y.	2.00	2.92	2.00
77. 7½-in. port. cem. conc. median pav't., Type A	1,217.5 s. y.	2.50	3.72	3.00
78. 7½-in. port. cem. conc. median pavmt., Type B	663.7 s. y.	2.50	3.71	3.00
79. 8-in. port. cem. conc. pavement	38,371.4 s. y.	2.15	2.37	2.40
80. Type 2-A integral concrete curb	12,617 l. f.	.25	5.58	.20
81. Type 4-A integral concrete curb	622 l. f.	.30	1.44	.20
82. Spec. Type 6-A integral conc. curb	8,100 l. f.	.15	.51	.20
83. Type 2 comb. conc. curb and gutter, 24-in.	1,715 l. f.	1.00	1.77	1.50
84. Type 4 comb. conc. curb and gutter, 30-in.	219 l. f.	1.10	2.04	2.00
85. Type 2 comb. conc. curb and gutter 30-in.	76 l. f.	1.50	2.66	2.00
86. 9-in. rein. concrete approach slab	356.6 s. y.	4.50	6.38	5.00

Structures—20-ft. span and under

Item	Quan.	Unit Prices (1)	(2)	(3)
87. Unclassified excavation, structures	177 c. y.	2.50	3.42	2.50
88. Channel excavation	227 c. y.	.80	2.29	1.00
89. Class E concrete, structures	12.9 c. y.	20.00	22.79	30.00
90. Class C concrete, structures	43.5 c. y.	30.00	27.66	35.00
91. Type B waterproofing	4.7 s. y.	2.00	.21	2.00
92. Reinforcing steel	3,941 lb.	.07	.076	.07
93. Remove portions exist structures	18 c. y.	10.00	15.11	20.00
94. Dowel holes	23 l. f.	1.00	2.52	1.00
95. 15-in. pl. cem. conc. pipe, incl. 5-in. encasement for roadway culverts	163 l. f.	4.00	4.44	5.00
96. 48-in. rein. conc. pipe, rdwy. culverts	122 l. f.	14.00	12.60	9.50

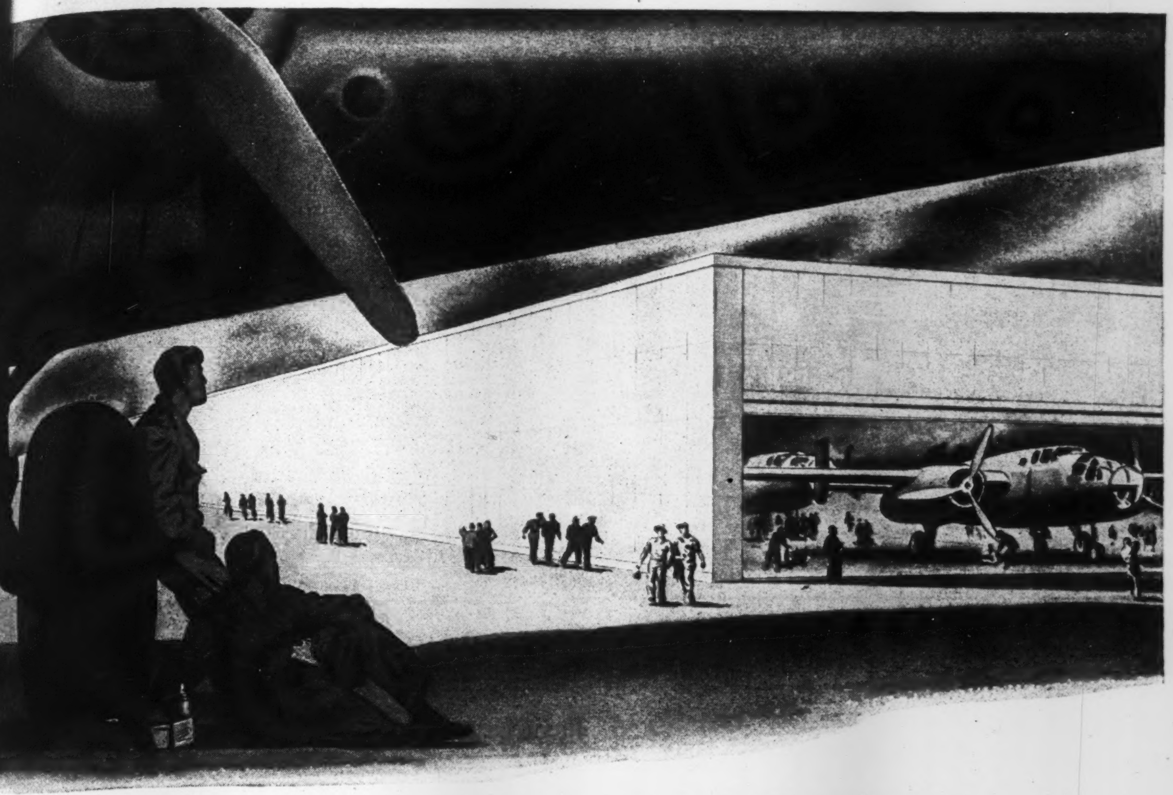
Roadside improvement

Item	Quan.	Unit Prices (1)	(2)	(3)
97. Aggregate for tree root aeration	27 c. y.	4.00	3.18	4.00
98. Renovating existing soil	586 M s. f.	3.00	2.52	2.00
99. Commercial fertilizer (4–12–4)	5,858 lb.	.04	.05	.06
100. Seeding, No. 2	4,355 s. y.	.04	.04	.04
101. Sodding	6,532 s. y.	.25	.38	.45
102. Riprap for tree protection	35 s. y.	4.00	5.03	5.00
103. Hall's Japanese honeysuckle (2 yr.)	1,295 ea.	.60	.44	.90
104. Maple trees, 3-in., salvaged	3 ea.	20.00	19.00	12.00
105. Seeding and protecting rdwy. areas	58,925 s. y.	.05	.06	.045

Structures—over 20-ft. span

Item	Quan.	Unit Prices (1)	(2)	(3)
106. Unclassified excav., structures	1,280 c. y.	4.00	4.76	5.00
107. Class C conc., superstructure	1,462 c. y.	40.00	46.67	40.00
108. Class E. conc., pier walls	1,189 c. y.	30.00	24.10	30.00
109. Class E conc., footings	566 c. y.	20.00	14.60	25.00
110. Furn. and incorporate black coloring material in median strip	4 c. y.	1.00	6.25	5.00
111. Type B waterproofing	70 s. y.	2.50	2.27	2.00
112. Reinforcing steel	287,300 lb.	.065	.06	.06

Looking ahead with Asbestos



"BOY, NOTHING HERE BUT A VACANT LOT 98 DAYS AGO!"

"Yes, sir," says Joe Wingworker, "Three months ago she was just a vacant lot, full of weeds and old tin cans. And now look at her! That asbestos lumber made a plane plant spring up mighty quick. And they tell me the stuff won't rot or rust or ever need paint."

Righto, Joe! That "Stuff" is Keasbey & Mattison's "Century" Apac Board, and if you have anything to do with construction or maintenance after this war, you'd better make a note of it. Why, it's not only maintenance-free, it actually gets tougher with age and it's fire-resistant and weather-resistant.

Also remember, Joe, that Apac is an all purpose board . . . it is designed for roofing or siding and for interior walls, ceilings and partitions. No wonder more than 50,000,000 square feet have been used in essential war construction to date. "Century" Apac Board goes up fast . . . is trouble-free thereafter.

Total war has shown manufacturers in all fields how to produce faster and better. This, coupled with the fact that wartime building needs have lessened considerably, means that this material is now available again for widespread use.

If industry has its way, this new production efficiency will be kept at work after the war, making all the things a peacetime world will want and need—new things resulting from vision and research today.

* * *

Nature made asbestos;
Keasbey & Mattison, America's asbestos pioneer,
has made it serve mankind . . . since 1873

KEASBEY & MATTISON
COMPANY, AMBLER, PENNSYLVANIA

K&M best in asbestos

Makers of

asbestos-cement shingles and wallboards; asbestos and magnesia insulations for pipes, boilers, furnaces; asbestos textiles; asbestos electrical materials; asbestos paper and millboard; asbestos marine insulations; asbestos acoustical material; asbestos packings; asbestos corrugated sheathing and flat lumbers; asbestos-cement pipe for water mains

113. Structural steel	313,000 lb.	.08	.07	.07
114. Wrought iron blast plates	4,500 lb.	.25	.11	.20
115. Field painting str. steel, incl. blast platres	317,500 lb.	.004	.006	.0038
116. ¼-in. premolded expan. joint filler	34 s. f.	.40	.53	.50
117. 1-in. p molded expan. joint filler	34 s. f.	.80	.71	1.00
118. 1/16-in. sheet asbestos rubber packing	52 s. f.	.30	1.00	1.00
119. Expansion joint	8.1 l. f.	2.00	1.00	1.50
120. Bridge railing (timber with conc. posts)	785.5 l. f.	6.00	4.40	3.00
121. First test pile	Lump Sum	650.00	630.00	2,000.00
122. First test load	Lump Sum	500.00	567.00	500.00
123. Subsequent test load	Lump Sum	100.00	504.00	200.00
124. 14-in. rein. conc. piling	9,580 l. f.	3.00	3.72	3.50
125. 2-in. fiber conduit	800 l. f.	.50	.29	.35
126. 10-in. pipe for sanitary sewer	85 l. f.	2.50	3.33	1.00
127. Unclassified structural excavation	2,130 c. y.	2.50	1.22	3.50
128. Class C concrete, frame	1,080 c. y	30.00	25.28	30.50
129. Class E concrete, wing walls	420 c. y.	25.00	31.56	23.00
130. Class E concrete, footings	435 c. y.	20.00	13.40	18.00
131. Type A waterproofing	435 s. y.	1.00	1.13	1.00
132. Type B waterproofing	56 s. y.	2.00	2.27	2.00
135. Reinforcing steel	165,660 lb.	.065	.06	.06
134. ½-in. premolded expan. joint filler	4 s. f.	.50	.75	2.00
135. 1-in. premolded expan. joint filler	810 s. f.	.75	.70	1.00
136. 1/16-in. sheet asbestos rubber packing	390 s. f.	.30	.95	1.00
137. Expansion joint	165 l. f.	2.00	.76	6.00
138. Bridge railing	156.2 l. f.	6.00	9.85	5.00
139. Bridge lighting system, complete	Lump Sum	500.00	951.00	2,000.00
140. 2-in. fiber conduit	225 l. f.	.50	.29	1.50
141. Porous backfill	295 c. y.	4.00	2.96	2.70
142. 8-in. bell and spigot rein. conc. pipe	310 l. f.	2.00	1.70	1.80
143. Furn. and incorporate black coloring matter in median strip	2 c. y.	2.00	6.50	100.00
144. Premium on industrial insurance	Lump Sum	4,000.00	7,350.00	4,000.00
145. Maintain traffic, incl. lights, signs, barricades and watchmen (24-hr. service)	Lump Sum	723.83	9,000.00	2,000.00

GRADE CROSSING ELIMINATION, SUMMIT COUNTY, OHIO

OWNER: State of Ohio, Department of Highways, Columbus, Ohio.

PROJECT: Construction of concrete rigid frame and continuous concrete beam highway overhead structures in connection with grade crossing elimination project in Summit County (Sections Akron, and B), Ohio. Approximately 1.791 miles long, including necessary concrete pavement. Also involves necessary grading, drainage, roadside improvement, and appurtenant structures on State Highways No. 543 and 526. Structure to ease traffic congestion, and provide easier access to defense plant in area.

CONDITIONS: Contractor to furnish all materials and complete work by December 31, 1942. Rail and highway transportation facilities available. Project has been assigned A-1-e priority rating. Wage rates are: skilled labor, $1.15 to $1.75 per hr.; semi-skilled, 75c. to $1.37½; and common, 50 to 82½c. per hr. Engineer's estimate, $678,800.

LIST OF BIDDERS: Bids opened April 28, 1942.

1. A. J. Baltes, Norwalk, Ohio (contract)	$675,899
2. Clemmer Constr. Co., and Thorpe Constr. Co., Akron Ohio	678,210

Item	Quan.	Unit Prices (1)	(2)	(3)*
1. Roadway excavation, unclass.	202,008 c. y.	$0.60	$0.50	$0.60
2. Borrow (contractor to furnish)	40,053 c. y.	.45	.50	.65
3. Seal exist. pavement edge	117 l. f.	.04	.10	.02
4. Water	1,075 M gal.	3.00	3.00	3.00
5. 12-in. vitr. sew. pipe; driveways	271 l. f.	1.30	1.00	1.40
6. 12-in. vitr. sew. pipe; storm sew. under pavement	2,337 l. f.	1.75	2.00	2.20
7. 15-in. as above	209 l. f.	2.30	2.00	2.10
8. 21-in. as above	54 l. f.	3.20	4.00	4.00
9. 18-in. as above	76 l. f.	3.00	2.50	3.10
10. 12-in. vitr. sew. pipe; rdwy. drainage	3,173 l. f.	1.50	2.50	3.00
11. 15-in. as above	597 l. f.	1.75	3.50	3.50
12. 18-in. as above	1,068 l. f	2.25	2.50	3.30
13. 21-in. as above	206 l. f.	3.00	3.25	2.60
14. 12-in. vitr. sew. pipe with sealed joints; roadway drainage outlets	668 l. f.	1.50	2.00	4.00
15. 15-in. as above	44 l. f.	1.75	2.25	4.20
16. 18-in. as above	24 l. f.	2.00	3.00	4.00
17. 12-in. vitr. sew. pipe; roadway drainage porous backfill, full depth	2,052 l. f.	1.75	3.25	4.00
18. 15-in. as above	222 l. f.	2.00	2.75	4.00
19. 8-in. as above	234 l. f.	1.50	2.00	1.30
20. 18-in. as above	200 l. f.	3.00	4.50	3.60
21. 6-in. vitr. clay cradle invert pipe; underdrains	4,542 l. f.	1.30	1.60	1.80
22. 4-in. ext. qual. drain tile; underdrains	12,880 l. f.	.40	.30	.44
23. 12-in. pipe spec.; storm sewer under pavmt.	2 ea.	5.00	2.00	[illegible]
24. 12-in. pipe specials; roadway drainage	1 ea.	5.00	2.00	[illegible]
25. 12-in. pipe spec. for rdwy. drainage with porous backfill, full depth	2 ea.	5.00	2.00	[illegible]
26. 6-in. pipe spec. for underdrains porous backfill, full depth	12 ea.	4.00	1.00	[illegible]
27. 12-in. pipe spec. for outlet pipe	6 ea.	5.00	2.00	[illegible]
28. 18-in. pipe spec.; storm sewer under pavmt.	1 ea.	15.00	3.00	[illegible]
29. Standard No. 1 manholes	2 ea.	200.00	100.00	[illegible]
30. Std. No. 1 manhole frames and covers	2 ea.	30.00	25.00	[illegible]
31. Std. No. 1-2A catch basins	20 ea.	75.00	60.00	[illegible]
32. Std. No. 1–3 catch basins	28 ea.	100.00	85.00	[illegible]
33. Std. No. 2-2A catch basins	4 ea.	75.00	65.00	[illegible]
34. Std. No. 2–5 catch basins	1 ea.	300.00	100.00	[illegible]
35. Std. No. 3 catch basins	93 ea.	200.00	105.00	[illegible]
36. Std. No. 7 catch basins	4 ea.	50.00	35.00	[illegible]
37. Std. No. 3 comb. inlet manholes	2 ea.	400.00	150.00	[illegible]
38. Std. No. 6 catch basins	1 ea.	100.00	75.00	[illegible]
39. Type B riprap	11 s. y.	6.00	3.00	[illegible]
40. Grouted type A riprap	179 s. y.	10.00	3.50	[illegible]
41. Concrete steps; 6-in. riser, 12-in. tread.	117 l. f.	1.75	2.00	[illegible]
42. Aggregate for traf. bound side appr.	407 c. y.	3.50	3.00	[illegible]
43. Classified embankment mat'l.	284 c. y.	1.35	1.00	[illegible]
44. Remove, dispose exist. curb	412 l. f.	.15	.20	[illegible]
45. Remove, dispose exist. bitum. wear course	2,550 s. y.	.20	.30	[illegible]
46. Remove, dispose of brick wear. course	209 s. y.	.35	.30	[illegible]
47. Remove, dispose of existing pavement	17,598 s. y.	.40	.40	[illegible]
48. Remove, dispose of existing header	140 l. f.	.15	.20	[illegible]
49. Remove and store pipe, 15-in. and under	647 l. f.	.50	.50	[illegible]
50. Remove, store pipe, 15-in. and over	95 l. f.	.75	.75	[illegible]
51. Remove and dispose of pipe	11 l. f.	.30	1.00	[illegible]
52. 3-in. fiber conduit	242 l. f.	1.50	1.00	[illegible]
53. Traf. compacted surf. crse. for traffic lanes	350 c. y.	3.00	3.00	[illegible]
54. Calcium chloride for traffic lanes	7 ton	40.00	40.00	[illegible]
55. Abandoned catch basins	6 ea.	10.00	10.00	[illegible]
56. 6x8-in. sawed wood guard rail posts	314 ea.	4.50	1.10	[illegible]
57. 1¼-in. insulation course	247 s. y.	.35	.20	[illegible]
58. 8-in. port. cem. conc. base course	349 s. y.	2.50	3.00	[illegible]
59. Waterbound macadam base crse., coarse aggr.	1,906 ton	3.25	4.00	[illegible]
60. Waterbound macad. base crse., screenings	699 ton	3.50	4.00	[illegible]
61. Asphaltic conc. leveling course	650 c. y.	16.00	15.00	[illegible]
62. Asphaltic conc. surface course, type B.	409 c. y.	16.00	16.00	[illegible]
63. Bituminous prime coat (RT-2)	2,493 gal.	.27	.20	[illegible]
64. 9-in. port. cem. conc. pavmt.	71,962 s. y.	2.60	3.00	[illegible]
65. Port. cem. conc. median strip	1.5 c. y.	35.00	25.00	[illegible]
66. 6x20-in. sandstone curb	12,880 l. f.	1.60	1.60	[illegible]
67. Type 4-A concrete curb	26,692 l. f.	.25	.30	[illegible]
68. Type A conc. median strip	425 l. f.	2.50	4.50	[illegible]
69. Type B conc. median strip	375 l. f.	2.75	5.00	[illegible]
70. Type 4 combin. curb and gutter	385 l. f.	1.25	1.50	[illegible]
71. 9-in. rein. conc. appr. slab	343.4 s. y.	6.00	7.00	[illegible]
72. Excav. for struct., unclassified	546 c. y.	1.75	3.00	[illegible]
73. Channel excavation	3,073 c. y.	.90	1.50	[illegible]
74. Class C conc.; structures	39.5 c. y.	30.00	30.00	[illegible]
75. Class E. conc.; structures	32.4 c. y.	30.00	20.00	[illegible]
76. Reinforcing steel	3,793 lb.	.07	.07	[illegible]
77. Remove portions of exist. structure	7 c. y.	10.00	5.00	[illegible]
78. Remove 2 exist. structures	L. S.	200.00	175.00	[illegible]
79. 12-in. rein. conc. pipe; rdwy. culv.	137 l. f.	2.00	3.50	[illegible]
80. 24-in. rein. conc. pipe; rdwy. culv.	73 l. f.	4.00	5.00	[illegible]
81. 30-in. rein. conc. pipe; rdwy. culv.	92 l. f.	6.00	6.50	[illegible]
82. 42-in. rein. conc. pipe; rdwy. culv.	242 l. f.	9.00	8.00	[illegible]
83. 48-in. rein. conc. pipe; rdwy. culv.	63 l. f.	11.00	9.00	[illegible]
84. 48-in. ext. str. rein. conc. pipe; rdwy. culv.	222 l. f.	12.00	10.00	[illegible]
85. 15-in. pipe spec. for roadway culvert	1 ea.	12.00	3.00	[illegible]
86. 24-in. pipe spec. for roadway culvert	1 ea.	25.00	8.00	[illegible]
87. 42-in. pipe spec. for roadway culvert	1 ea.	40.00	25.00	[illegible]
88. Excav. for struct., unclassified	2,700 c. y.	2.50	5.00	[illegible]
89. Cl. C conc.; superstruct. and walls	1,185 c. y.	40.00	35.00	[illegible]
90. Class E conc.; footings	170 c. y.	25.00	20.00	[illegible]
91. Type A waterproofing	550 s. y.	1.75	.30	[illegible]
92. Type B waterproofing	110 s. y.	1.00	2.50	[illegible]
93. Reinforcing steel	184,340 lb.	.07	.065	[illegible]
94. Wrought iron blast plates	4,400 lb.	.12	.10	[illegible]
95. Folded lead strip	190 l. f.	1.50	1.00	[illegible]
96. ½-in. premolded expan. joint filler	860 s. f.	.20	.30	[illegible]
97. Bridge railing (conc. and timber)	250 l. f.	3.50	2.25	[illegible]
98. 3-in. fibre conduit	250 l. f.	2.00	1.00	[illegible]
99. Porous backfill	300 c. y.	3.00	3.00	[illegible]
100. Riprap	40 s. y.	8.00	3.00	[illegible]
101. Furn. and incorporate black coloring mat'l. in conc.	24 s. y.	.25	1.00	[illegible]
102. Cofferdams and pumping	L. S.	5,000.00	7,000.00	[illegible]
103. Struct. excavation, unclassified	1,070 c. y.	1.75	3.00	[illegible]
104. Class C conc.; superstructures	655 c. y.	40.00	40.00	[illegible]
105. Class E conc.; walls	457 c. y.	30.00	26.00	[illegible]
106. Class E conc.; footings	459 c. y.	25.00	20.00	[illegible]
107. Type B waterproofing	52 s. y.	1.75	2.50	[illegible]
108. Reinforcing steel	266,560 lb.	.07	.065	[illegible]
109. Structural steel	10,500 lb.	.20	.09	[illegible]
110. Wrought iron blast plates	1,100 lb.	.12	.10	[illegible]
111. 1/16-in. sheet asbestos packing	66 s. f.	.50	1.00	[illegible]
112. Bridge railing (timber and conc.)	387.9 l. f.	3.50	2.25	[illegible]
113. First test pile (incl. steel point)	L. S.	300.00	300.00	[illegible]
114. 14-in. creosoted timber piling	6,500 l. f.	2.50	2.00	[illegible]
115. Steel pile points	312 ea.	2.00	2.00	[illegible]
116. 3-in. fibre conduit	392 l. f.	2.00	1.00	[illegible]
117. Furn. and incorporate black coloring mat'l. in median strip	163 s. y.	.25	1.00	[illegible]
118. Seeding and protecting roadway areas	183,907 s. y.	.0425	.04	[illegible]
119. Sodding (sodded ditches)	7,234 s. y.	.40	.40	[illegible]
120. Commercial fertilizer (10–6–4)	33,104 lb.	.045	.03	[illegible]
121. Premium on industrial insurance	L. S.	10,000.00	7,300.00	7,559.86
122. Maintain traffic, incl. lights, signs, barricades, watchman service	L. S.	5,585.00	8,400.00	2,825.00

* *Engineer's estimate.*

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THE STABILIZED TRACING PAPER

GRADE SEPARATION, CALIFORNIA

OWNER: California State Highway Dept., Los Angeles, Calif.

PROJECT: Construction of two reinforced concrete grade separation structures on the Pacific Highway at Witherby St., and at Barnett Ave., in San Diego, Calif. Includes all excavation, paving, drainage structures and appurtenant work. Project has preference rating of A-1-e.

CONDITIONS: Contractor to furnish all materials. Work is financed in whole or in part with federal funds, therefore, all federal statutes, rules and regulations apply during construction period. Highway transportation facilities available. Wage rates are: skilled labor, $1.50 per hr.; semi-skilled, $1.25; and common, 87½c.

LIST OF BIDDERS: (Bids opened February 19, 1942.)

1. J. E. Haddock, Ltd., Pasadena ,Calif. (contract)	$761,938
2. R. E. Hazard & Sons, San Diego, Calif.	834,314

Item	Quan.	Unit Prices (1)	(2)
1. Remove concrete	3,950 c. y.	$3.00	$6.00
2. Clear and grub	L. S.	750.00	1,000.00
3. Roadway excavation	3,800 c. y.	.60	.75
4. Structural excavation	47,000 c. y.	3.40	2.80
5. Trench excavation	3,000 c. y.	1.90	2.50
6. Imported borrow	6,000 c. y.	.90	.80
7. Topsoil	800 c. y.	2.10	1.80
8. Preparation of subgrade	18,500 s. y.	.13	.12
9. Water supply and equipment	L. S.	700.00	1,100.00
10. Water	400 M gal.	1.30	2.00
11. Finish roadway	20 sta.	25.00	15.00
12. Liquid asphalt SC-2 (prime coat)	3 ton	50.00	30.00
13. Liq. asph. MC-3, MC-4 or MC-5 (plant mix surf.)	13 ton	19.00	20.00
14. Mineral aggregate (plant mix surf.)	245 ton	4.00	4.25
15. Asphaltic concrete	650 ton	4.80	5.25
16. Asph. emulsion asphaltic concr. (seal coat and paint binder)	4 ton	30.00	40.00
17. Screenings (seal coat)	28 ton	3.00	3.00
18. Class B portland cem. conc. pavmt	3,835 c. y.	8.50	9.00
19. Pavement dowels	1,150 ea.	.28	.30
20. Cl. A portland cem. conc. (seal)	7,550 c. y.	12.00	14.00
21. Cl. A portland cem. conc. (struct.)	10,150 c. y.	23.00	25.00
22. Steel rail	2,305 l. f.	10.60	11.00
23. Furnish concrete piles	17,640 l. f.	2.00	3.00
24. Drive piles	704 ea.	25.00	60.00
25. Cl. A portland cem. conc. (curb, gutters)	470 c. y.	19.00	20.00
26. Cl. A portland cem. conc. (sidewalks)	280 c. y.	16.50	17.00
27. Pipe handrail (Type A)	65 l. f.	5.65	6.00
28. Pipe handrail (Type B)	90 l. f.	2.60	3.00
29. 20-ft. drive gates	2 ea.	50.00	50.00
30. Move and rest property fence	260 l. f.	.55	.50
31. 10-in. rein. conc. pipe, std. str	400 l. f.	1.80	2.00
32. 12-in. as above	1,125 l. f.	2.20	2.50
33. 18-in. as above	345 l. f.	3.00	3.00
34. 24-in. as above	1,450 l. f.	3.70	4.00
35. 8-in. corr. met. pipe, 16-ga	1,234 l. f.	1.10	1.00
36. 12-in. as above	316 l. f.	1.45	1.50
37. 18-in. as above	100 l. f.	2.10	2.00
38. 24-in. corr. met. pipe, 14-ga	65 l. f.	3.00	3.00
39. 6-in. perf. metal pipe underdrains	90 l. f.	.80	1.00
40. Rock fill	10 c. y.	4.00	4.00
41. Salvage exist. rein. conc. and corr. met. pipe	1,500 l. f.	.65	.75
42. Relay salv. rein. conc. and corr. met. pipe	930 l. f.	.55	.60
43. 6-in. cast iron pipe	282 l. f.	2.00	2.00
44. 12-in. cast iron pipe	885 l. f.	3.90	4.00
45. Salvage cast iron pipe	1,020 l. f.	.50	.50
46. Furnish reinforcing steel bars	582,000 lb.	.06	.065
47. Place rein. steel bars	582,000 lb.	.015	.02
48. Rubber waterstops	790 l. f.	1.10	1.00
49. Salvage frames and gratings	5 ea.	20.00	20.00
50. Frames and gratings for curb inlets	3 ea.	90.00	100.00
51. Frames and covers, catch basins	20 ea.	75.00	70.00
52. Manhole frame and cover	1 ea.	35.00	50.00
53. Adjust manholes to grade	4 ea.	25.00	25.00
54. Pump house	L. S.	1,030.00	1,200.00
55. Remove exist. pipe handrail	100 l. f.	.50	.50
56 Sidewalk drain	12 ea.	11.00	12.00
57. Electrical equipment	L. S.	25,000.00	28,000.00
58. Pump equipment	L. S.	8,850 00	9,200 00
59. Miscellaneous work	L. S.	20,000.00	15,000.00

CONCRETE OVERPASS, UTAH

OWNER: Utah State Road Commission, Salt Lake City; John S. Evans, Chairman.

PROJECT: Construction of concrete T-beam overhead crossing over Denver & Rio Grande Western Railroad tracks, concrete T-beam bridge over Jordan River, and concrete box culvert on 21st South St., between Main St. and Redwood Rd. in Salt Lake City. Railroad overhead crossing is 255 ft. long.

CONDITIONS: Contractor to furnish all materials and complete work in 170 working days. Rail and highway transpo tion facilities available. Wage rates are: skilled labor, $1 to $1.35 per hour; semi-skilled, 90c; and common, 75c.

BIDS: Five bids were opened December 29, 1942, rang from the contract low of $132,976 to $186,783. Enginee estimate $138,078.

LIST OF BIDDERS:

1. Gibbons & Reed Co., Salt Lake City, Utah (contract)	$132,9
2. Young & Smith Constr. Co., Salt Lake City, Utah	135,
3. George M. Carruth & Son, Evanston, Wyo	141,
4. W. W. Clyde & Co., Springville, Utah	170,
5. A. O. Thorn & Sons Constr. Co., Springville, Utah	186,

Item	Quan.	Unit Prices (1)	(2)
1. Excavation for structures	525 c. y.	$3.00	$5.00
2. Concrete, Class A	160 c. y.	35.00	42.00
3. Reinforcing steel	36,500 lb.	.09	.07
4. Excav. for structures, overhead bridge	600 c. y.	3.50	3.00
5. Concrete, Class A	1,000 c. y.	35.00	38.00
6. Reinforcing steel	230,000 lb.	.09	.07
7. Structural steel	29,000 lb.	.22	.25
8. Concrete handrail	511 l. f.	4.00	7.00
9. Piles, treated	6,000 l. f.	2.20	2.00
10. Furnish pile driving equipmt	Lump Sum	400.00	1,000.00
11. Electrical equipment	Lump Sum	200.00	500.00
12. 6 or 8-in. perf. corr. galv. metal pipe underdrains	200 l. f.	1.25	2.00
13. Excav. for structures, bridge over 20-ft. span	300 c. y.	3.50	5.00
14. Concrete, Class A	400 c. y.	35.00	38.00
15. Reinforcing steel	90,000 lb.	.09	.07
16. Structural steel	1,700 lb.	.22	.25
17. Concrete handrail	375 l. f.	4.00	7.00
18. Concrete piles	1,400 l. f.	8.50	8.00
19. Test pile	1 ea.	800.00	800.00
20. Furnish pile driving equipmt	Lump Sum	400.00	700.00
21. Remove existing structures	Lump Sum	4,000.00	4,000.00
22. 6 or 8-in. perf. corr. galv. metal pipe underdrains	60 l. f.	1.25	2.00
23. 6 or 8-in. perf. corr. galv. metal pipe	34 l. f.	1.25	2.00

DIRECTIONAL AND PEDESTRIAN ISLANDS, WASHINGTON, D. C.

OWNER: Department of Highways, District of Columbi Washington, D. C.

PROJECT: Construction of directional and pedestrian island for channelization of traffic, including car loading island the reconstruction and changes in layout of roadways an curb lines, or alternates; setting or resetting of curbing construction of gutters; repairs to sidewalks and other pave ments disturbed by said work; repair of existing pavement and other incidental and miscellaneous work necessary fo completion of project. Islands are to be constructed o asphaltic and concrete pavements, and buttons are to be place at nose end of islands. Also involves cleaning of the pavemen areas in the various locations throughout the District upo which the islands are to be placed.

CONDITIONS: Contractor to furnish all materials excep straight and circular 8x12-in. stone curbing which is to b furnished by the District, and the mushroom buttons whic are to be furnished and hauled to the site of the work b the Capital Transit Co. Time for completion: December 3 1942. Highway and rail transportation facilities availabl Wage rates are: skilled labor, $1.25 to $1.50; intermedia grade, 80c. to $1.00; and unskilled, 75c.

BIDS: Three bids were received August 21, 1942, ranging from the contract low of $39,498 to $41,861. Awarded September 2, 1942.

LIST OF BIDDERS:

1. Donaldson Paving Co., Inc., Washington, D. C. (contract)	$39,4
2. Wilmoth Paving Co., Washington, D. C.	40,5
3. McGuire & Rolfe, Inc., Washington, D. C.	41,86

Item	Quan.	Unit Prices (1)	(2)
1. Earth, or ordinary excavation	150 c. y.	$0.90	$1.50
2. Borrow excavation	25 c. y.	.90	1.50

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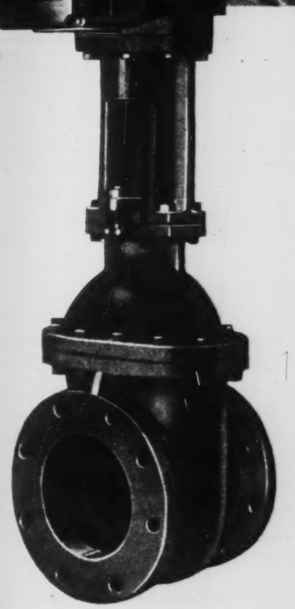

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3. Excav. existing hard-surf. pavmt. (bitum, pavmt. complete incl. conc. base)	50 c. y.	2.00	3.00	2.00
4. Excav. exist. hard-surf. pavmt. (asph. surf. and binder from conc. base stripping)	450 c. y.	2.75	3.00	3.00
5. Sidewalk excav.	5 c. y.	.90	1.50	2.00
6. Remove roadway, bitum. tr. or water-bound macadam and old material	60 c. y.	:90	2.00	2.00
7. Dispose of surplus excavated matl	12,200 c. y. ¼ mi.	.03	.03	.03
8. Plain cem. conc. base crse., 8-in	300 s. y.	3.30	2.60	3.50
9. Sheet asphalt pavement	300 s. y.	1.20	1.25	1.25
10. Binder mixture for sheet asph. pavmt.	20 ton	7.00	10.00	10.00
11. Surface mixture for sheet asph. pavmt.	50 ton	10.00	10.00	11.00
12. Bitum. surf. course, CM-A	50 ton	8.00	10.00	11.80
13. Cem. conc. sidewalks, 4-in.	75 s. y.	2.45	2.20	2.60
14. Cement concrete curbing	300 l. f.	1.10	.90	1.30
15. Set 8x12-in. straight stone curbing	100 l. f.	.95	1.00	1.10
16. Set 8x12-in. stone curb. (circular)	125 l. f.	1.20	1.00	1.30
17. Reset 6x20-in. str. stone curbing	25 l. f.	.90	.90	1.00
18. Reset 8x12-in. str. stone curbing	25 l. f.	.90	1.00	.90
19. Reset circ. 8x12-in. stone curbing	50 l. f.	.90	1.00	1.00
20. Reset 8x8-in. str. stone curbing	250 l. f.	.90	1.00	.90
21. Reset 8x8-in. circ. stone curbing	25 l. f.	.90	1.00	1.00
22. Remove old stone curbing	150 l. f.	.40	.25	.25
23. New vitr. block gutter or alley entrances on 7-in. cement conc. base	50 s. y.	6.00	6.25	6.70
24. Adjust manhole frames and basin covers to grade	5 ea.	4.00	5.00	6.00
25. Adjust water valve casings to grade	5 ea.	6.00	5.00	7.00
26. Adj. public utilities' manhole fr. under 6 s. f. in area	2 ea.	1.00	5.00	1.00
27. As above, 6 to 16 s. f. in area	2 ea.	1.00	5.00	1.00
28. As above, over 16 s. f. in area	2 ea.	4.00	5.00	2.00
29. Cem. conc. for cem. conc. base course	20 c. y.	16.00	10.00	24.75
30. Cem. conc. for cem. conc. pavmt	10 c. y.	18.00	12.00	16.00
31. Cutting off vitr. block, cem. conc. rdway., alley, sidewalk pavmt., cem. conc. bases, asph. conc. pavmt., plant mix, to neat line	500 l. f.	.25	.25	.20
32. Removal of various types of old pavmt. when power shovel is impracticable	25 c. y.	3.00	3.50	4.00
33. Standard portland cement	25 bbl.	2.45	2.50	2.50
34. Calcium chloride	500 lb.	.03	.02	.02
35. Exp. joints for cem. conc. sidewalks	300 l. f.	.22	.25	.50
36. ¾-in. expan. joint for pavements, alleys.	50 l. f.	.60	.50	.75
37. Asphaltic conc. base course	10 ton	8.00	9.00	7.00
38. Surface heater treatment	800 s. y.	.40	.25	.30
39. Cem. conc. for all types of islands	1,350 c. y.	23.67	24.50	24.75
40. Mushroom type buttons in pavement	77 ea.	.60	1.00	1.00
41. Conc. removed, 2-in. deep, in connection with cutting grooves for islands	20 s. y.	1.50	.90	1.00
42. Replace and repair cem. conc' sidewalks	150 s. y.	2.45	2.25	2.60

EL MONTE PIPELINE
SAN DIEGO, CALIF.

OWNER: Federal Works Agency, Los Angeles, and City of San Diego, Calif.

PROJECT: Construction of El Monte pipeline (Unit 8) for supplying water to San Diego, Calif. Length approximates 50,000-feet, running from two miles east of Lakeside to point about 7½ miles west of Lakeside. Alternates were allowed for reinforced concrete steel cylinder pipe, electric welded steel pipe, or cast iron bell and spigot pipe. Contract awarded on former. Pipe thickness 48-in.; wall thickness 5½-in.; cylinder thickness, 10-gage.

CONDITIONS: Contractor to furnish all materials except valves and meters (Venturi meter and cone valves provided in contract as shown in bid tabulation below) and complete work in 180 calendar days. Highway transportation facilities available. Difficulty in securing satisfactory help may increase costs. Wage rates are: skilled labor, $1.10 to $1.50 per hr.; semiskilled, $1.00; and common, 80c.

BIDS: Only one bid was received on each of the reinforced concrete steel cylinder pipe and the electric welded steel cylinder pipe alternates; none on cast iron. Bids opened May 12, 1942. Contract awarded May 19, 1942.

Venturi Meter—Control and Miscellaneous Valves

LIST OF BIDDERS:

1. American Pipe & Constr. Co., South Gate, Calif. (contract) $28,792

Item	Quan.	Unit Price (1)
1. 30-in. needle valve for throttling service, 48-in. pipeline, static head 350-ft	1 ea.	$10,575.00
2. 30-in. cone valve, for same (alternate)	1 ea.	5,800.00
3. 30-in. needle valve for shut-off service, 48-in. pipeline, static head 400-ft	3 ea.	8 250.00
4. 30-in. cone valve, for same (alternate)	3 ea.	
5. Venturi meter	1 ea.	
6. 6-in. vertical flanged gate valves	11 ea.	

NOTE: Needle valves and cone valves are alternates. Bid figured on cone valves.

Reinforced Concrete Steel Cylinder Pipe—Schedule 1

LIST OF BIDDERS:

1. American Pipe & Constr. Co., South Gate, Calif. (contract) ....

Item	Quan.
1. Excavation, Class 1	114,500 c.y.
2. Backfill	84,175 c.y.
3. Sand for backfill	15,000 c.y.
4. Excavation and backfill	120 c.y.
5 Excavation and backfill, Class 3	200 c.y.
6. 48-in. I.D. rein. conc. steel cylinder pipe	2,700 l.f.
7. 48-in., as above	3,210 l.f.
8. 48-in., as above	3,700 l.f.
9. 48-in., as above	7,620 l.f.
10. 48-in., as above	7,630 l.f.
11. 48-in., as above	7,100 l.f.
12. 48-in., as above	13,300 l.f.
13. 48-in., as above	3,800 l.f.
14. Furn. and install I.D. rein. conc. 10-ga. steel cylinder pipe	255 l.f.
15. Furn. and inst. 30-in. ⅜-in. plate elec. welded steel pipe	20 l.f.
16. Furn. and inst. 30-in. 7/16-in. as above	40 l.f.
17. Load, haul, install 30-in. horizontal bevel geared hub end control valve for throttling service	1 ea.
18. Load, haul, install 30-in. horiz. bevel geared hub end control valve	3 ea.
19. Load, haul, install Venturi meter	1 ea.
20. Furn. and inst. 6-in. blow-off valve assemblies	11 ea.
21. Furn. and inst. 4-in. comb. pressure air-vacuum valve assemblies	14 ea.
22. Concrete in piers, anchor blocks	20 c.y.
23. Renforced concrete in valve chamber	40 c.y.
24. Break and replace concrete pavement	1,900 s.f.
25. Break and replace oiled surface pavement	25,000 s.f.
26. Cement in place in work (Items 22, 23 and 24)	146 bbl.
27. Reinf. steel in place in work (Items 22 and 23)	7,000 lb.
28. Furn. and install 18-in. access manholes, c. i. covers	10 ea.
29. Furn., inst. 22-in. city std. c.i. manhole frame and covers	14 ea.
30. Furn. and inst. complete centrif.-spun rein. conc. pipe, 1,000-D load	30 l.f.
31. Field office	1 ea.
32. Project signs	4 ea.

Electric Welded Steel Pipe—Schedule 11

LIST OF BIDDERS:

1. Macco Construction Co., Clearwater, Calif.........

Item	Quan.
1. Excavation, Class 1	99,130 c.y.
2. Backfill	75,100 c.y.
3. Sand backfill	15,000 c.y.
4. Excavation and backfill, Class 2	120 c.y.
5. Excavation and backfill, Class 3	100 c.y.
6. 48-in. I.D. ⅜-in. plate, elec. welded steel pipe	24,774 l.f.
7. 48-in., 7/16-in., as above	24,260 l.f.
8. 36-in., ⅜-in., as above	255 l.f.
9. 30-in., ⅜-in., as above	20 l.f.
10. 30-in., 7/16-in., as above	40 l.f.
11. Load, haul, install 30-in. horiz. bevel geared hub end control valve for throttling service	1 ea.
12. Load, haul, install 30-in. horiz. bev. geared hub end control valve	3 ea.
13. Load, haul, install Venturi meter	1 ea.
14. 6-in. blow-off valve assemblies	11 ea.
15. 4-in. comb. pressure air-vacuum valve assemblies	14 ea.
16. Conc. in piers and anchor blocks	20 c.y.
17. Rein. conc. in valve chambers	40 c.y.
18. Break and replace conc. pavement	1,900 s.f.
19. Break and replace oiled surf. pavement	25,000 s.f.
20. Cement in place in work (Items 16, 17 and 18)	146 bbl.
21. Rein. steel in place in work (Items 16 and 17)	7,000 lb.
22. 18-in. access manholes with cast iron covers	10 ea.
23. 22-in. city standard cast iron manhole frames and covers	14 ea.
24. 30-in. centrif.-spun rein. conc. pipe, 1,000-D load	30 l.f.
25. Field office	1 ead
26. Project signs	4 ea.

WATER DISTRIBUTION SYSTEM
MILTON, WASHINGTON

OWNER: Town of Milton, Washington, Kay Kirkland, Tow Clerk; Parker & Hill, Smith Tower, Seattle, engineers.

PROJECT: Construction of reservoir and water distributio system in Milton, Pierce County, near Tacoma, Wash. Include furnishing and laying of asbestos-cement pipe, relaying wrought iron pipe, service connections, connecting existing standpipes to new main, and all necessary valves, boxes and cast iron fittings. Asbestos-cement pipe is 4-in. in diameter, and relaid wrought iron pipe is 2-in.

CONDITIONS: Contractor to furnish all materials and com

Correctly Designed and Constantly Improved

"CLEVELANDS"

Meet The Spirit As Well As The Letter of War Emergency Demands

Because they are built in tune with the War Production needs "CLEVELANDS" have been selected for a multitude of projects by all branches of the U. S. Military and Naval Services and for the ditching on many, various War Emergency Pipe Lines.

Their weight-saving design and construction releases thousands of tons of steel required for the building of the ships, tanks, armament, etc., essential to Victory.

Exceptionally easy to maneuver, "CLEVELANDS" can be quuickly loaded on freight car or truck and because of their extreme compactness take but a minimum of the vital space needed for the transportation of war materials.

Correctly engineered they generate ample power for the toughest jobs with a substantial conservation of oil and gasoline.

Sturdily built from super-quality materials, "CLEVELANDS" deliver hundreds of hours of operation without major repairs, and when minor repairs are needed their unit type construction permits quick easy field replacements.

With "CLEVELANDS" on the ditching job every move is a faster move and every unit of work is done with less fuel, less essential materials and at less expense. Thus "CLEVELAND" is cooperating with the wishes and the requirements of the government to speed up war work.

THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVE. *"Pioneer of the Small Trencher"* CLEVELAND, OHIO

"CLEVELANDS" Save More . . . Because they Do More

plete work in 180 calendar days. Rail and water transportation facilities available to Tacoma, and highway to site of work. Wage rates are: skilled labor, $2.00 per hour; semiskilled, $1.50; and common labor, $1.10.

BIDS: Three bids were received December 10, 1942, ranging from the contract low of $24,254 to $28,686. Engineer's estimate, $24,500.

LIST OF BIDDERS:

1. Neukirch Bros., Seattle, Wash. (contract)	$24,254
2. E. L. Burrows and James Milone, Tacoma, Wash	27,638
3. M. Moschetto, Seattle, Wash	28,686

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Construct reservoir	Lump Sum	$10,800.00	$7,400.00	$14,000.05
2. 4-in. asbestos-cement pipe	6,600 l. f.	1.45	1.90	1.60
3. Relay 2-in. wrt. iron pipe	1,660 l. f.	.75	1.00	.60
4. Service connections	40 ea.	5.00	80.00	10.00
5. Connect exist. standpipes to new 4-in. main	3 ea.	50.00	150.00	25.40
6. Take up 2-in. wrt. iron pipe	2,250 l. f.	.60	.50	.00
7. 4-in. pressure reducing valve	1 ea.	150.00	300.00	175.00
8. 4-in. gate valves	12 ea.	25.00	20.00	25.00
9. 2-in. gate valves	3 ea.	15.00	8.00	17.75
10. Valve boxes	18 ea.	10.00	10.00	10.00
11. Cast iron fittings	2,500 lb.	.10	.20	.15

WATER SUPPLY LINES, SEATTLE, WASH.

OWNER: Seattle Water District No. 20, Seattle, Wash.; Gardner, Gardner & Hitchings, Arctic Building, Seattle, engineers.

PROJECT: Construction of approximately 8.5 miles of water supply lines ranging from 4 to 10-in. diameter, in suburban area south of Seattle, Wash. Involves connection of new lines to existing city lines, clearing, grading, necessary excavation, and furnishing and laying of cast iron water pipe. Alternates were asked on three different types of pipe lines: cast iron pipe, cement-asbestos pipe, and wood pipe. Contract was awarded on the basis of cast iron, though both of the other alternates were lower.

CONDITIONS: Contractor to furnish all material. No time limit was set for completion. Rail and water transportation facilities are available to Seattle, and highway to site of work. Wage rates are: skilled labor, $2.00 per hr.; semiskilled, $1.65; and common, $1.25.

BIDS: Three bids were received June 12, 1942 on the cast iron pipe lines, ranging from $106,324 to $113,991. Two bids on the cement-asbestos pipe alternate were $102,510 and $103,795; and on the wood pipe alternate, $89,708 and $95,817.

LIST OF BIDDERS: Cast iron pipe—basis of award.

1. Valley Construction Co., Seattle, Wash. (contract)	$106,324
2. L. Colluccio, Seattle, Wash	107,149
3. Angelo Scarsella, Seattle, Wash	113,991

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 10-in. connection to city main	1 ea.	$1,300.00	$1,300.00	$1,300.00
2. 6-in. connection to city main	1 ea.	800.00	800.00	800.00
3. Clearing	1 ac.	600.00	400.00	400.00
4. Grading	4,000 c.y.	.75	.60	.60
5. Crossing pavement	80 l.f.	10.00	6.50	3.00
6. Extra excavation	900 c.y.	2.00	1.30	2.50
7. Salvaging present 4-in. pipe	5,000 l.f.	.20	.50	.25
8. Relay salvaged 4-in. pipe	1,300 l.f.	.50	.40	.75
9. Goosenecks, complete in place	100 ea.	7.40	5.50	10.00
10. 10-in. gate valves, in place	3 ea.	92.00	125.00	90.00
11. 8-in. gate valves, in place	13 ea.	61.00	85.00	65.00
12. 6-in. gate valves, in place	13 ea.	42.00	52.00	45.00
13. 4-in. gate valves, in place	16 ea.	28.00	no bid	30.00
14. Valve chambers, conc. or brick, etc.	5 ea.	80.00	90.00	85.00
15. Valve boxes, cast iron	48 ea.	10.00	12.00	10.00
16. Replace 6-in. wood pipe with 8-in. wood pipe: contractor to retain 6-in. wood pipe (SW 136th St.)	3,600 l.f.	1.75	1.80	no bid
17. 4-in. bolted c.i. pipe or welded steel pipe: complete in place with extra excav.; concrete piers and fasteners; for creek crossing. (400 l.f.)	L.S.	1,100.00	780.00	1,600.00
18. 8-in. cast iron pipe, in place	12,100 l.f.	2.46	2.60	2.60
19. 8-in. cem. asbestos pipe (alternate)	12,100 l.f.	2.24	2.50	no bid
20. 8-in. wood pipe (alternate)	12,100 l.f.	1.83	2.25	no bid
21. 6-in. cast iron pipe	9,600 l.f.	1.88	1.80	2.00
22. 6-in. cem. asbestos pipe (alternate)	9,600 l.f.	1.81	1.75	no bid
23. 6-in. wood pipe (alternate)	9,600 l.f.	1.59	1.65	
24. 4-in. cast iron pipe	14,900 l.f.	1.51	1.45	
25. 4-in. cem. asbestos pipe	14,900 l.f.	1.49	1.35	
26. Saddles for 4-in. cem. asbestos pipe (alt.)	150 ea.	7.00	2.00	
27. Wood pipe, 4-in. (alternate)	14,900 l.f.	1.37	1.30	
28. 10-in. cast iron pipe	4,740 l.f.	3.16	3.30	
29. 10-in. cem. asbestos pipe (alternate)	4,740 l.f.	2.90	3.20	
30. 10-in. wood pipe (alternate)	4,740 l.f.	2.29	2.60	

WATER SUPPLY SYSTEM, SCHENECTADY, N. Y.

OWNER: City of Schenectady, Department of Water; J H. Burwell, Chief Engineer. Malcolm Pirnie, New Y N. Y., Consulting Engineer.

PROJECT: Construction of water supply system (C tracts 2, 3, 4 and 5) located west of Schenectady, N. Y., the west side of the Mohawk River and the old Erie Ca about 1,500 feet south of existing pumping station of City. Contract No. 2—Structures, Equipment and Pipin includes excavation, concrete masonry, cast iron piping, V turi meters, chlorine and ammonia equipment, pump equipment, cement asbestos piping, road surfacing, grad and grassing, brick work and miscellaneous work necess for construction of control building, and about nine houses and connecting pipe lines. Contract No. 3—Electri Work—includes outdoor substation; conduits and wir between the station, wells and control building; motor c trol equipment; lighting; and exhaust fans in each well hou Contracts No. 4 and 5—Plumbing and Heating—are furnishing and installing small service water piping ins and outside of buildings; fixtures; drains; connecting pip in administration building; and furnishing coal-fired heati system.

CONDITIONS: Contractor to furnish all materials and co plete work in 300 calendar days. Rail, highway and wa transportation facilities available. Wage rates are: skill labor, $1.00 to $1.70 per hour; semi-skilled, 75c. to $1 and common, 75c to 85c.

BIDS: Four bids were received on Contract 2 October 1942; three on Contract 3; and two each on Contracts 4 and All bidders and amounts of bids are shown in tabulati below.

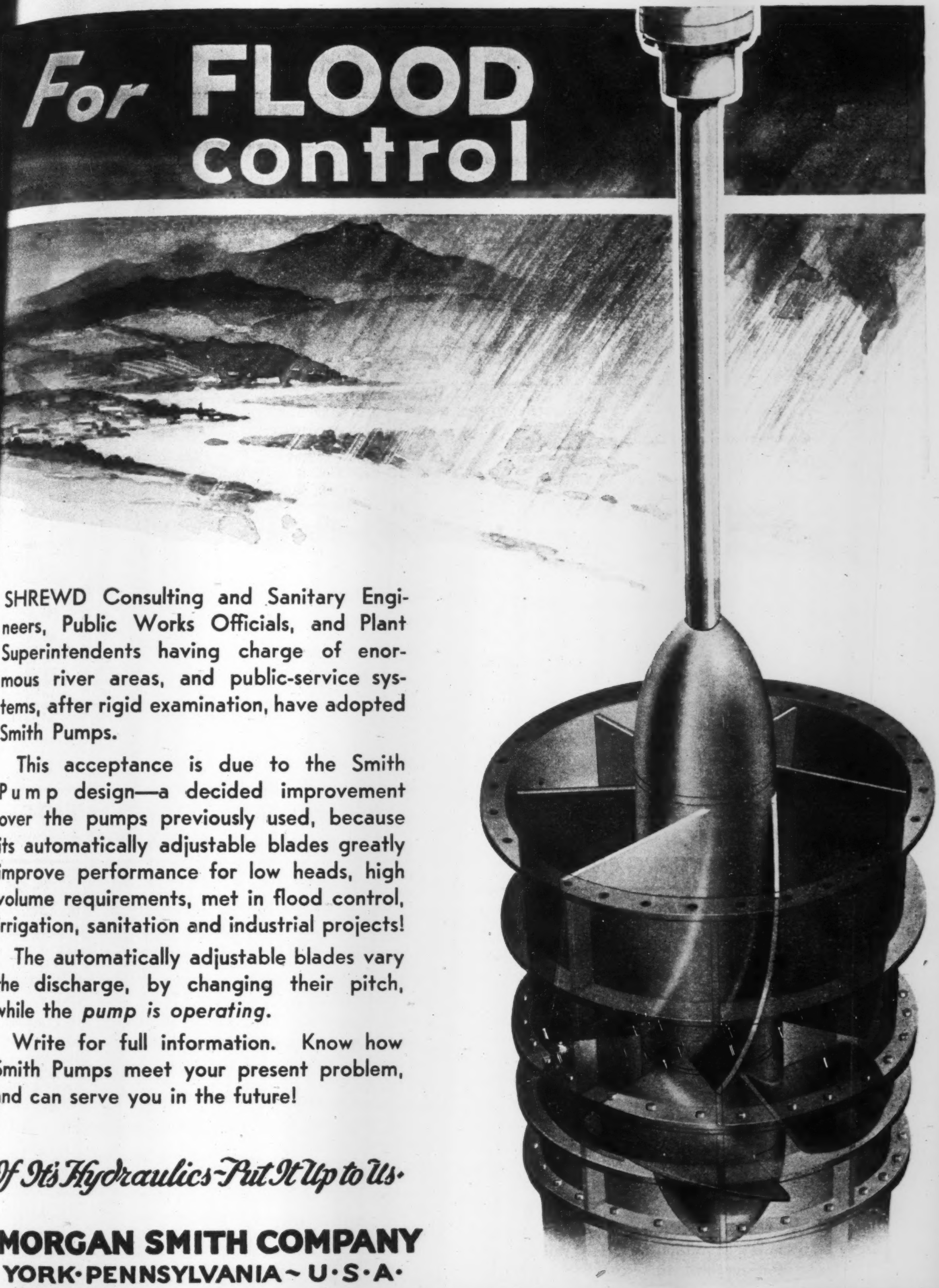
Contract No. 2—Structures, Equipment and Piping

LIST OF BIDDERS:

1. Stock Construction Corp., New York, N. Y. (contract)	$208
2. Turbine Equipment Co., Inc., New York, N. Y	280
3. Thomas C. Brown Co., Inc., Schenectady, N. Y	295
4. Maguire & Dugan, Inc., Brooklyn, N. Y	298

Item	Quan.	Unit Prices (1)	(2)	(3
1. Excavation	9,600 c. y.	$0.60	$1.18	$2
2. Class A concrete	1,600 c. y.	22.00	30.90	33
3. Class B concrete	350 c. y.	10.00	25.75	22
4. Steel reinforcing	120,000 lb.	.05	.067	
5. B. & S. cast iron pipe	150 ton	110.00	96.60	97
6. B. & S. cast iron pipe fittings	30 ton	210.00	219.65	202
6a. Flanged cast iron pipe	2 ton	150.00	264.50	188
6b. Flanged cast iron fittings	50 ton	285.00	281.75	260
7. 24-in. gate valve	9 ea.	800.00	803.00	1,150
8. 18-in. gate valve	1 ea.	400.00	356.00	587
9. 14-in. gate valve	9 ea.	225.00	211.00	400
10. 8-in. gate valve (hub ends)	1 ea.	70.00	69.00	84
11. 8-in. gate valve (flanged ends)	1 ea.	60.00	57.50	79
12. 6-in. gate valve (hub ends)	1 ea.	50.00	46.00	62
13. 6-in. gate valve (flanged ends)	1 ea.	40.00	34.50	57
14. 4-in. gate valve	1 ea.	30.00	22.00	42
15. 4-in. gate valve (extension stem)	2 ea.	35.00	34.50	48
16. 3-in. gate valve	5 ea.	25.00	17.50	31
17. 2½-in. gate valve	9 ea.	20.00	14.00	21
18. 2-in. gate valve	7 ea.	15.00	11.00	16
19. 2-in. gate valve (extension stem)	2 ea.	25.00	23.00	24
20. 18-in. check valve	1 ea.	525.00	517.00	613
21. 14-in. check valve	8 ea.	350.00	300.00	380
22. 3-in. check valve	2 ea.	20.00	11.50	23
23. 2-in. check valve	2 ea.	15.00	9.00	14
24. 6-in. flap valve	9 ea.	30.00	44.00	40
25. 6-in. pressure reducing valve	1 ea.	225.00	230.00	245
26. 4-in. pressure reducing valve	1 ea.	160.00	161.00	179
27. 6-in. pressure relief valve	9 ea.	220.00	205.00	250

For FLOOD control



SHREWD Consulting and Sanitary Engineers, Public Works Officials, and Plant Superintendents having charge of enormous river areas, and public-service systems, after rigid examination, have adopted Smith Pumps.

This acceptance is due to the Smith Pump design—a decided improvement over the pumps previously used, because its automatically adjustable blades greatly improve performance for low heads, high volume requirements, met in flood control, irrigation, sanitation and industrial projects!

The automatically adjustable blades vary the discharge, by changing their pitch, while the *pump is operating.*

Write for full information. Know how Smith Pumps meet your present problem, and can serve you in the future!

If It's Hydraulics–Put It Up to Us·

S·MORGAN SMITH COMPANY
YORK·PENNSYLVANIA ~ U·S·A·

POWER *by* SMITH

28. 2½-in. air and vacuum relief valve..	9 ea.	110.00	92.00	105.00
29. 1-in. air relief valve..............	5 ea.	35.00	30.00	36.00
30. ½-in. air relief valve..............	9 ea.	12.00	23.00	12.00
31. 6-in. hydrant..................	3 ea.	150.00	143.00	185.00
32. Miscellaneous iron and steel work..	10,000 lb.	.05	.26	.1910
33. Venturi meters.................	Lump Sum	7,000.00	8,720.00	7,600.00
34. Connections to existing mains.....	Lump Sum	4,000.00	4,100.00	1,922.00
35. 4-in. cement asbestos pipe........	1,000 l. f.	1.00	.60	.854
36. 6-in. cement asbestos pipe........	1,500 l. f.	1.30	.96	1.20
37. Chlorine and ammonia equipment.	Lump Sum	12,500.00	15,180.00	14,829.00
38. High service units (well pumping equipment)..................	8 ea.	5,000.00	4,798.00	5,330.00
39. Low service units (well pumping equipment)..................	1 ea.	6,000.00	5,866.00	6,782.00
40. Road surfacing.................	3,200 s. y.	1.80	1.30	4.50
41. Concrete drain pipe............	225 l. f.	2.00	1.20	1.40
42. Grading and grassing...........	8 ac.	200.00	309.00	470.00
43. Drain and sewage pumps.........	Lump Sum	2,200.00	2,600.00	2,824.00
44. Superstructures................	Lump Sum	20,000.00	63,150.00	43,620.00

Contract No. 3—Electrical Work

LIST OF BIDDERS:

1. M. Gold & Son, Schenectady, N. Y. (contract) $79,500
2. Turbine Equipment Co., Inc., New York, N. Y. 81,610
3. Utility Electric Co., Inc., New York, N. Y. 109,625

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Electrical work................	Lump Sum	$79,500.00	$81,610.00	$109,625.00

Contract No. 4—Plumbing

LIST OF BIDDERS:

1. Thomas C. Brown Co., Inc., Schenectady, N. Y. (contract) $3,560.00
2. Turbine Equipment Co., Inc., New York, N. Y. 5,260.00

		Unit Prices	
Item	Quan.	(1)	(2)
1. Plumbing..........................	Lump Sum	$3,560.00	$5,260.00

Contract No. 5—Heating

LIST OF BIDDERS:

1. Thomas C. Brown Co., Inc., Schenectady, N. Y. (contract) $2,880.00
2. Turbine Equipment Co., Inc., New York, N. Y. 3,975.00

		Unit Prices	
Item	Quan.	(1)	(2)
1. Heating..........................	Lump Sum	$2,880.00	$3,975.00

WATER MAINS, DETROIT, MICHIGAN

OWNER: City of Detroit, Board of Water Commissioners, Detroit, Mich.; L. G. Leuhardt, general sup't.

PROJECT: Construction of water mains along Belton Avenue and Meyers Road (Contract DM-1), and on Meyers Road from Belton to West Chicago Avenue (Contract DM-2) in Detroit, Mich. Includes furnishing and laying of approximately 7,900 feet of 72-in. steel shell reinforced concrete pressure pipe; 96 feet of 48-in. steel shell reinforced concrete pressure pipe; all necessary 12-in. cast iron pipe, and sewer pipe ranging from 12 to 24 in. in diameter. Furnishing and placing of gate valves is also included. Alternates were allowed on the gate valves, either the American Waterworks Association specifications, or Detroit Department of Water Supply specifications could be installed. Contract was awarded on the former basis.

CONDITIONS: Contractor to furnish all the materials and completed in 150 days. Contractor is to purchase manufactured pipe. Rail and highway transportation facilities available near site of work. Wage rates specified are: skilled labor, $1.67½ to $1.75 per hour; semi-skilled, $1.25; and common, 87½c.

BIDS: Four bids were received on each contract July 8, 1942. On Contract DM-1 the bids ranged from $220,000, the contract low, to $225,000. On Contract DM-2 they ranged from the contract low of $233,099 to $245,000.

Contract DM-1—Belton Ave. and Meyers Rd.

LIST OF BIDDERS:

1. **Gargaro Co., Inc., Detroit, Mich.** (contract) $220,0
2. **Chris Nelsen Co., Royal Oak, Mich** 220,0
3. **Frank J. Knight Co., Centerline, Mich.** 222,1
4. **N. D. Mancini & G. Vella, Base Line, Mich** 225,0

		Unit Prices		
Item	Unit	(1)	(2)	(3)
1. 72-in. steel shell reinforced conc. pressure pipe (3,946 l.f.)........................	l.f.	$43.00	$52.60	$53.
2. 12-in. cast iron pipe (incl. specials)..........	l.f.	8.00	5.00	4.
3. Sewer manholes........................	ea.	225.00	250.00	225.
4. 6-in. drain........................	l.f.	4.60	3.00	3.
5. 12-in. sewer........................	l.f.	5.00	3.50	4.
6. 15-in. sewer........................	l.f.	5.25	3.50	5.
7. 18-in. sewer........................	l.f.	6.25	9.00	8.
8. 24-in. sewer........................	l.f.	7.00	11.50	10.
9. 12-in. A.W.W.A. gate valves............	ea.	89.00	110.00	125.
10. 48-in. A.W.W.A. gate valves............	ea.	2,750.00	3,500.00	8,500.
11. 12-in. D.W.S. gate valves (alternate)..........	ea.	no bid	145.00	150.
12. 48-in. D.W.S. gate valves (alternate)..........	ea.	no bid	4,000.00	4,000.

Contract DM-2—Meyers Rd. from Belton to West Chicago Av

LIST OF BIDDERS:

1. Frank J. Knight Co., Centerline, Mich (contract) $233,09
2. Gargaro Co., Inc., Detroit, Mich 234,00
3. Chris Nelsen Co., Royal Oak, Mich 243,31
4. N. D. Mancini & G. Vella, Base Line, Mich 245,00

		Unit Prices		
Item	Unit	(1)	(2)	(3)
1. 72-in. steel shell rein. conc. pressure pipe (3,956 l.f.)........................	l.f.	$57.35	$43.00	$59.
2. 48-in. steel shell rein. conc. pressure pipe (96 l.f.)........................	l.f.	40.50	24.00	42.
3. 12-in. cast iron pipe........................	l.f.	4.90	8.00	5.
4. Sewer manholes........................	ea.	225.00	225.00	250.
5. 12-in. sewer........................	l.f.	4.00	5.00	3.5
6. 12-in. A.W.W.A. gate valves............	ea.	125.00	89.00	117.
7. 16-in. A.W.W.A. gate valves............	ea.	325.00	188.00	350.
8. 48-in. A.W.W.A. gate valves............	ea.	3,500.00	2,750.00	3,600.
9. 12-in. D.W.S. gate valves (alternate)..........	ea.	150.00	no bid	135.
10. 16-in. D.W.S. gate valves (alternate)..........	ea.	400.00	no bid	425.
11. 48-in. D.W.S. gate valves (alternate)..........	ea.	4,000.00	no bid	4,300.

WATERWORKS IMPROVEMENTS ELK CITY, OKLAHOMA

OWNER: City of Elk City, Okla.; J. R. Willis, Tulsa, engr.

PROJECT: Waterworks improvements at Elk City, Okla., involving construction of 3,400-ft. steel pipe line crossing the North Fork of Red River. Pipe diameter is 14 in.

CONDITIONS: Contractor to furnish all materials except steel pipe, reinforcing and structural steel, and gate valve. Bids were also asked on relocation of 1,950 ft. of steel pipeline, and removal and storage of 2,800 ft. of 14-in. cast iron pipe line, but these items were deleted from the specifications in the final form. Time for completion: 90 days. Rail and highway transportation facilities available to Elk City. Wage rates are skilled labor, $1.25 per hour; semi-skilled, 75c.; and common, 50c.

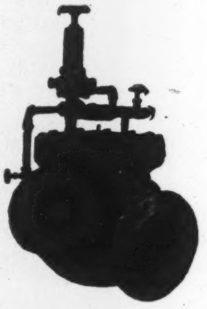
BIDS: Two bids were received December 15, 1942, the contract low of $36,491 and $39,617.

LIST OF BIDDERS:

1. Sherman Machine & Iron Works, Oklahoma City, Okla. (contract) $36,491
2. Midwest Engineering and Construction Co., Tulsa, Okla. 39,617

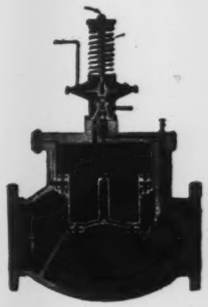
		Unit Prices	
Item	Quan.	(1)	(2)
1. Install 14-in. steel pipe line....................	3,400 l. f.	$8.80	$10.00
2. Class A concrete....................	85 c. y.	30.00	35.00
3. Class B concrete....................	36 c. y.	25.00	35.00
4. Install rein. and struct. steel....................	34,400 lb.	.09	.08
5. Install 14-in. gate valve with box....................	Lump Sum	25.00	350.00

UT PRESSURE TO WORK WITH G-A VALVES



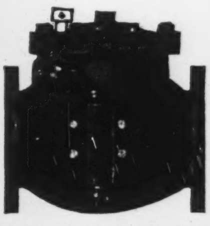
Water Pressure Relief Valve . . . opens automatically, on excess pressure, to dissipate necessary water volume to maintain desired line pressure. Valves may be arranged to open at abnormal pressures and held open under subnormal pressures until the surge subsides. Valve is arranged either with atmospheric pilot valve exhaust or self-contained, according to service conditions and requirements. Sizes: 3" to 36".

● Assure a high degree of continuous service . . . full line openings without pressure drop on automatic and manual operating services — altitude, reducing, check, relief, emergency, shut-off, etc., with G-A Specialty Valves. Now, as always, GOLDEN - ANDERSON Valves are meeting service requirements at low operational cost; giving performance beyond normal expectations. Write for our latest catalog . . . contains a complete description of all GOLDEN-ANDERSON Valves.

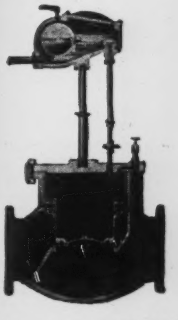


Stop Check Single Acting Altitude Valve . . . automatically maintains a uniform water level within 3" to 12" variation to prevent any tank overflow. Prevents loss or return of storage water back through the valve — makes the valve very desirable for use wherever metered water is purchased, or wherever it is imperative that there be no possible return flow. Valve may be fitted with "Differential" Control for delayed opening. Furnished in 2" to 36" sizes.

Cone Thru-Flow Valves . . . assure a full line opening without pressure drop on automatic services. In lieu of gate valves these Cone Valves can be supplied manually operated. Furnished for any automatic services such as altitude, check, relief, etc. Sizes from 4" to 72".



Cushioned Swing Check Valves . . . to be used on air compressor lines, water lines, etc. A swing check valve, properly designed for balanced operation to assure a full line flow with minimum pressure drop. Specially arranged cushion chamber on the side prevents slapping or banging of disc against seat on reverse flow. Furnished in globe pattern with non-corrosive trim . . . 4" to 36" sizes.



High Pressure Controlling Float Valve . . . particularly adaptable for water level control in heaters, reservoirs, basins, etc., under high inlet pressure where a very close water level must be maintained. Needle valve control permits regulating closing speed of the valve to suit conditions, and inherent air and water cushioning assures smooth operation at all times without shock or bang. Sizes from 3" to 36".

GOLDEN-ANDERSON VALVE SPECIALTY CO.

FULTON BLDG. . . . CLEVELAND, OHIO

WATER TUNNELS, CHICAGO

OWNER: City of Chicago; Oscar E. Hewitt, Commissioner of Public Works, W. W. DeBerard, City Engineer.

PROJECT: Tunnel connections from new South District Filtration Plant to Southwest Land Tunnel System. Includes driving and lining of 16-ft. circular tunnel in E. 74th St., 13-ft. circular tunnel in Oglesby Ave., branches, stubs, riser shafts, gate and valve installations.

CONDITIONS: Project is extension of existing tunnels. City owns a 14-ft. construction shaft, equipped with electric elevator and 10-ton derrick, certain buildings, power lines, centrifugal pumps installed to keep tunnels dry, and 100 ft. of 16-ft. steel forms, all available to contractor without charge except for operation and maintenance. Project has A-2 priority rating. The 10-ft. gate shaft must be sunk by caisson method. Muck is to be disposed of in Lake Michigan near the filter plant. Minimum wage rates specified include: Hoisting, mixer, compressor and pump engineers, and ironworkers, $1.70, all overtime at double rate; miners, $1.425; caisson diggers, $1.35; muckers, $1.275; concrete workers, $1.175; common labor, $1.025; all on overtime basis of 1½ rates for first 2½ hr., then double time.

BIDS: Five bids were received on April 2, 1942:

LIST OF BIDDERS:

1. Wenzel & Henoch, Milwaukee, Wis	$737,294
2. John C. Tully & Co., Chicago	785,190
3. Paschen Contractors, Inc., Chicago	820,273
4. Kenny Const. Co., Chicago	836,018
5. M. Pontarelli & Sons, Chicago	1,074,546

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Tunnel, 16-ft., tangent	3,050 l. f.	$146.00	$156.00	$167.30
2. Tunnel, 16-ft. curve	110 l. f.	195.00	224.00	208.07
3. Tunnel, 13-ft. tangent	950 l. f.	118.00	139.00	137.81
4. Tunnel, 13-ft., curve	118 l. f.	188.00	195.00	168.01
5. Rise shaft, 10-ft	L. S.	2,600.00	2,800.00	2,735.25
6. Vent shaft, 5-ft	L. S.	8,000.00	8,500.00	5,755.75
7. Tunnel conn., Yates Ave	L. S.	15,000.00	13,000.00	14,924.00
8. Tunnel conn., Oglesby Ave	L. S.	7,160.00	10,700.00	8,844.50
9. Tunnel stub, 13-ft	L. S.	29,500.00	27,200.00	29,172.00
10. Gate shaft, 10-ft	L. S.	30,700.00	22,100.00	28,294.00
11. Install 72-in. gate valve	L. S	16,000.00	20,000.00	20,000.00
12. Timbering in rock	50 Mf.b.m.	120.00	100.00	90.00
13. Special grout	1,000 bbl.	8.00	7.70	8.00
14. Reinf. steel	10,000 lb.	.08	.05	.065
15. Rock excav	500 c. y.	10.00	5.00	10.00
15. Add'l concrete	500 c. y.	12.00	15.00	14.00
17. Tunnel drainage	30 days	50.00	73.00	50.00

STORM AND SANITARY SEWER SAN FRANCISCO, CALIF.

OWNER: City of San Francisco, Dept. of Public Works, John J. Casey, city engineer.

PROJECT: Constructing combined storm and sanitary sewer (brick) on Jackson Street between Sansome and Battery Streets, in San Francisco. Sewer is 300 feet long, 11 feet in depth, and five feet in diameter. Project also involves relocation of some existing water mains, alterations to auxiliary water supply pipeline, and traffic control work.

CONDITIONS: City is to furnish the following pipe, fittings, etc., in connection with the water main relocation: 270-ft. of 8-in. bell and spigot cast iron pipe, Class 150; one 8-in. bell end gate valve; 1,200 lb. bell and spigot cast iron fittings; 100 lb. steel lugs and tier bars; six ¾-in. screw taps for services; and one 2-in. screw tap for services. Contractor to furnish all other material and complete work in 120 days. Underground water may be reached at a depth of approximately 10-ft. Rail and highway transportation facilities available to site of work. Minimum wage rates are: skilled labor, $1.2125 per hour; semi-skilled, $1.0625; and common, 95c.

LIST OF BIDDERS: (Bids received February 3, 1943)

1. M. J. Lynch, San Francisco, Calif. (low bidder)	$39,61
2. Eaton & Smith, San Francisco, Calif	43,35

Item	Quan.	Unit Prices (1)	(2)
1. Three-ring brick sewer, 5-ft. diam	300 l. f.	$107.00	$126
2. 6-in. vitr. clay pipe side sewer	25 l. f.	7.00	2
3. 8-in. vitr. clay pipe side sewer	25 l. f.	7.00	3
4. 15-in. vitr. clay pipe sewer	25 l. f.	10.00	5
5. 10-in. vitr. clay pipe, culvert and side sewer	55 l. f.	8.00	3
6. Brick manholes on brick sewer	2 ea.	100.00	125
7. Brick manhole on vit. clay pipe sewer	1 ea.	350.00	200
8. 12-in. vitr. clay pipe subdrain	300 l. f.	3.50	1
9. Rock fill	120 c. y.	6.00	3
10. Relocate water main and service	Lump Sum	1,000.00	800
11. Alterations to A. W. S. system pipeline	Lump Sum	2,500.00	2,000
12. Traffic control work	Lump Sum	650.00	1,000

SANITARY SEWER, MISSOURI

OWNER: City of Kansas City, Mo.; Department of Publi Works.

PROJECT: Construction of sanitary sewer (extension of Blu River Sewer) approximately two miles long, from 91st St and Woodland Ave., to 79th and Cleveland Aves., Kansa City, Mo. Sewer 42-in. diameter for 6,500 feet of length and 24-in. diameter for balance.

CONDITIONS: Contractor to furnish all materials and complete work in 90 days. Highway transportation facilities available to site of work. Wage rates are: skilled labor, $1.50 to $1.65 per hour; and common labor, 55 to 90c.

LIST OF BIDDERS: (Bids opened October 27, 1942.)

1. General Contracting Co., Inc., Kansas City, Mo. (low bid)	$189,74
2. J. A. Tobin Constr. Co., Kansas City, Mo. (contract)	202,35
3. Bowen Constr. Co., Kansas City, Mo.	211,27
4. H. A. Williams & Co., Kansas City, Mo.	244,02

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 24-in. rein. concrete pipe, trench	2,070 l. f.	$10.00	$12.00	$15.00
2. 24-in. rein. conc. pipe, on trestle	928 l. f.	4.00	4.25	4.00
3. 24-in. ext. str. conc. pipe, tunnel	652 l. f.	30.00	30.00	75.00
4. 42-in. rein. conc. pipe, in trench	6,128 l. f.	15.00	14.75	10.00
5. 42-in. rein. conc. pipe, trestle	352 l. f.	7.00	9.10	8.00
6. Reinforced concrete, trestles	315 c. y.	50.00	75.00	75.00
7. Plain. conc. in cradle and ditch drain	820 c. y.	22.00	19.00	20.00
8. Base rock	440 c. y.	5.00	2.75	10.00
9. Load bearing timber piling	2,800 l. f.	2.75	2.50	3.00
10. 6-in. farm drain tile	630 l. f.	1.50	.85	1.50
11. Manholes	23 ea.	150.00	365.00	250.00
12. Junction chamber	1 ea.	500.00	575.00	500.00
13. Support for 3 tracks near Sta. 46	Lump Sum	2,800.00	3,500.00	3,500.00

SEWERAGE SYSTEM, NEW JERSEY

OWNER: City of Long Branch, N. J.

PROJECT: Construction of sewage treatment plant and appurtenances (Section I); outfall sewer with approximately 2,745 ft. of 30-in. reinforced concrete pipe and 1,200 ft. of 16-in. wrought iron pipe in ocean outlet (Section II); and 44,240 ft. of interceptor sewer ranging from 8-in. to 30-in. of both reinforced concrete and vitrified clay pipe (Section III).

CONDITIONS: Contractor to furnish all materials and complete work in 250 calendar days. Rail and highway transportation facilities available. Wages prevailing in area to be paid. Outfall sewer pipe laid on sand to permit movement.

Section No. 1—Sewage Treatment Plant

LIST OF BIDDERS: (Bids opened Jan. 19, 1942.)

1. Thomas Proctor Co., Long Branch, N. J. (contract)	$200,457
2. Sutter Constr. Co., New York, N. Y.	298,445

Item	Quan.	Unit Prices (1)	(2)
1. Excavation, unclassified	7,000 c. y.	$4.00	$1.00
2. Rock excavation	100 c. y.	5.00	10.00

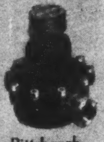
DOING THE BIG JOBS WELL

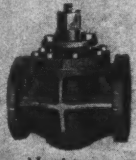
☆EMCO Sewage Gas Meters

☆PITTSBURGH Hot and Cold Water Meters

☆NORDSTROM Lubricated Plug Valves

EMCO Sewage Gas Meter

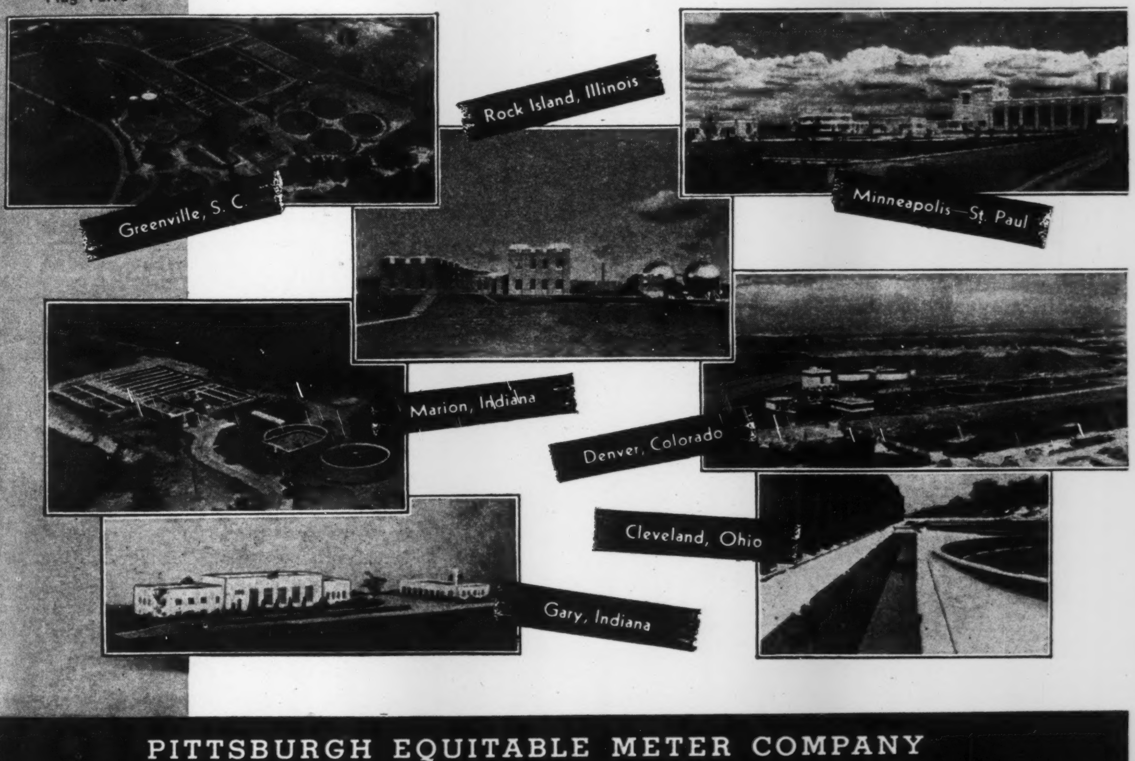

Pittsburgh Hot and Cold Water Meter


Nordstrom Lubricated Plug Valve

SEWAGE treatment and disposal practice has made tremendous strides during the past decade. The sewage plants erected during this era, and those projected, will function with the highest degree of efficiency and dependability through the foresight of their designers in the careful selection of all equipment. They will have a favorable effect on the health and well-being of large and small population centers alike for many years to come.

We are proud of the fact that our meters and valves have been specified for use in the majority of the largest sewage treatment plants that have been erected.

Accuracy in measurement and control is important to the efficient operation of any size plant. EMCO Sewage Gas Meters can be relied upon for the accurate measurement of all gas generated during sludge digestion which is used as a source of heat and power. Pittsburgh Hot and Cold Water Meters will definitely determine the cost of the large quantity of water consumed in and about the plant. Nordstrom Valves, due to their leak resistance, corrosion-proof construction, and easy, positive operation, provide absolute control and assure the most satisfactory service on all lines in sewage treatment plants.



PITTSBURGH EQUITABLE METER COMPANY

MERCO NORDSTROM VALVE COMPANY
Main Offices, Pittsburgh, Pa.
NATIONAL METER DIVISION, Brooklyn, N. Y.

NEW YORK · OAKLAND · BROOKLYN · TULSA · DES MOINES · CHICAGO · MEMPHIS · BOSTON · KANSAS CITY · SEATTLE · PHILADELPHIA · HOUSTON · SAN FRANCISCO · COLUMBIA · LOS ANGELES · BUFFALO

3. Timber and lumber	30 M bm.	$50.00	$100.00
4. Treated lumber	25 M bm.	200.00	200.00
5. Steel sheet piling	10 ton	65.00	100.00
6. Wood piles	20,000 l. f.	.60	1.00
7. Wood piles, creosoted	2,000 l. f.	1.00	1.85
8. Pile anchors	2,500 lb.	.15	.16
9. Underdrains, 4 to 6-in.	600 l. f.	.60	.35
10. Crushed stone	500 c. y.	4.00	3.60
11. 5-in. terra cotta pipe	50 l. f.	1.20	.80
12. 6-in. terra cotta pipe	300 l. f.	1.30	.80
13. 8-in. terra cotta pipe	24 l. f.	2.00	1.00
14. 12-in. terra cotta pipe	24 l. f.	2.25	1.50
15. 12-in. rein. concrete pipe	40 l. f.	2.50	2.00
16. 15-in. rein. concrete pipe	156 l. f.	3.00	3.00
17. 18-in. rein. concrete pipe	115 l. f.	4.00	4.00
18. 24-in. rein. concrete pipe	30 l. f.	7.00	5.00
19. 30-in. rein. concrete pipe	172 l. f.	12.00	8.00
20. Manholes, 0 to 6-ft. deep	6 ea.	80.00	100.00
21. Manholes, 6 to 10-ft. deep	2 ea.	90.00	125.00
22. Manholes, 10 to 12-ft. deep	1 ea.	100.00	300.00
23. Manholes, 12 to 16-ft. deep	1 ea.	130.00	350.00
24. Catch basins, 0 to 6-ft. deep	6 ea.	85.00	100.00
25. Class A concrete	1,500 c. y.	22.00	50.00
26. Class B concrete	200 c. y.	18.00	15.00
27. Expansion joints	150 l. f.	.40	3.00
28. Steel reinforcement	110 ton	120.00	160.00
29. B. & S. cast iron pipe	20 ton	120.00	210.00
30. B. & S. cast iron specials	7 ton	200.00	290.00
31. Flanged cast iron pipe	5 ton	200.00	270.00
32. Flanged cast iron specials	3 ton	300.00	400.00
33. Cast iron wall casting	1.5 ton	250.00	410.00
34. Ext. hvy. c. i. soil pipe	2 ton	110.00	300.00
35. Cast iron floor drains	200 lb.	.30	1.00
36. 1½-in. black wrt. iron pipe	300 l. f.	.40	1.05
37. 2-in. black wrt. iron pipe	130 l. f.	.50	2.20
38. 2½-in. black wrt. iron pipe	630 l. f.	.60	2.40
39. 4-in. black wrt. iron pipe	60 l. f.	.70	6.00
40. 6-in. black wrt. iron pipe	25 l. f.	.80	10.00
41. 1-in. Everdur pipe	25 l. f.	2.00	6.60
42. 2-in. brass pipe	90 l. f.	1.00	4.20
43. 1½-in. quick-opening valves	12 ea.	8.00	15.00
44. 2-in. screw end gate valves	2 ea.	10.20	10.00
45. 3-in. screw end gate valves	1 ea.	14.40	20.00
46. 6-in. hub end gate valves	3 ea.	29.60	50.00
47. 8-in. hub end gate valves	1 ea.	45.75	80.00
48. 10-in. hub end gate valves	3 ea.	68.80	130.00
49. 12-in. hub end gate valves	1 ea.	95.35	175.00
50. 4-in. flanged end gate valves	2 ea.	21.50	45.00
51. 6-in. flanged end gate valves	15 ea.	33.00	60.00
52. 8-in. flanged end gate valves	13 ea.	48.00	80.00
53. 2½-in. plug valves	8 ea.	12.50	25.00
54. 2-in. screw end check valves	2 ea.	8.00	15.00
55. 2½-in. screw end check valves	4 ea.	10.00	20.00
56. 6-in. flanged end check valves	3 ea.	33.00	75.00
57. 8-in. flanged end check valve	2 ea.	55.00	120.00
58. 6-in. mud valve	1 ea.	31.00	70.00
59. 4-in. fire hydrant	1 ea.	75.00	75.00
60. 1-in. lawn hydrant	2 ea.	30.00	25.00
61. 2-in. relief valve	1 ea.	38.00	65.00
62. Floor stands	11 ea.	35.00	60.00
63. Extension stems	175 l. f.	1.00	4.00
64. Valve boxes	110 l. f.	1.50	5.00
65. Aluminum plates, etc	900 lb.	1.65	2.00
66. Aluminum floor gratings	335 s. f.	3.70	5.00
67. Bronze tablet	L. S.	100.00	125.00
68. Addl. 1½-in. pipe railing	300 l. f.	3.00	3.00
69. Addl. structural steel	2 ton	280.00	300.00
70. Addl. ornamental iron	1,000 lb.	.60	.20
71. Mechan. cl. bar screen, etc	L. S.	3,400.00	3,375.00
72. Grit collector, etc	L. S.	5,600.00	5,455.00
73. Sludge collectors	L. S.	4,350.00	11,300.00
74. Sewage pumps	L. S.	2,500.00	3,620.00
75. Sludge pump	L. S.	1,100.00	1,250.00
76. Sump pump	L. S.	80.00	160.00
77. Independent water supply	L. S.	1,200.00	3,000.00
78. Digestor equipment	L. S.	17,000.00	15,320.00
79. Engine—generator	L. S.	4,600.00	9,980.00
80. Chlorinating equipment	L. S.	5,875.00	6,500.00
81. Chemical feed equipment	L. S.	725.00	1,675.00
82. Flow recorder	L. S.	1,050.00	1,100.00
83. Regulator equipment	L. S.	1,550.00	2,400.00
84. Superstructures	L. S.	26,000.00	52,000.00
85. Painting	L. S.	900.00	3,000.00
86. Painting digestor equipment	L. S.	200.00	2,000.00
87. Miscellaneous equipment	L. S.	1,500.00	3,925.00
88. Parking areas, roads, etc	L. S.	4,800.00	8,000.00

Section No. 2—Outfall Sewer

1. Thomas Proctor Co., Long Branch, N. J. (contract)	$77,786
2. Joseph Miele Constr. Co., Maplewood, N. J.	99,787
3. Spiniello Constr. Co., Newark, N. J.	106,745
4. Clevorock Inc., New York, N. Y.	129,950

1. Excavation, unclassified	500 c. y.	$1.00	$5.00	$0.01
2. Rock excavation	100 c. y.	6.00	2.00	.01
3. Timber and lumber	160 M bm.	60.00	99.00	.01
4. Steel sheet piling	10 ton	100.00	108.00	.01
5. Wood piles, creosoted	1,000 l. f.	1.00	2.00	1.60
6. Pile anchors	200 lb.	.15	.20	.15
7. 4 to 6-in. underdrain	2,500 l. f.	.80	.36	.40
8. Crushed stone	200 c. y.	4.00	7.00	3.00
9. Class A concrete	20 c. y.	30.00	35.00	28.00
10. Class B concrete	200 c. y.	25.00	22.50	16.00
11. Steel reinforcement	5 ton	100.00	180.00	240.00
12. 30-in. rein. conc. pipe, 0–6-ft. deep	625 l. f.	5.75	9.50	9.00
13. 30-in. rein. conc. pipe, 6–8-ft. deep	340 l. f.	6.25	10.60	14.00
14. 30-in. rein. conc. pipe, 8–10-ft. deep	450 l. f.	7.00	11.80	18.00
15. 30-in. rein. conc. pipe, 10–12-ft. deep	290 l. f.	8.25	13.00	25.00
16. 30-in. rein. conc. pipe, 12–14-ft. deep.	340 l. f.	10.50	14.50	26.25
17. 30-in. rein. conc. pipe, 14–16-ft. deep.	700 l. f.	11.50	16.00	28.00
18. Manholes, 0 to 6-ft. deep	3 ea.	80.00	125.00	78.00
19. Manholes, 6 to 8-ft. deep	1 ea.	85.00	140.00	88.00
20. Manholes, 8 to 10-ft. deep	1 ea.	100.00	160.00	100.00
21. Manholes, 12 to 14-ft. deep	2 ea.	125.00	250.00	125.00
22. Manholes, 14 to 16-ft. deep	1 ea.	200.00	300.00	140.00
23. Outfall manhole	L. S.	1,400.00	6,000.00	3,400.00
24. Railroad crossing	L. S.	2,500.00	4,000.00	3,70
25. 16-in. wrought iron ocean outfall	L. S.	26,000.00	22,000.00	33,00
26. Road restoration	2,500 l. f.	1.00	.60	1.

Section No. 3—Interceptor Sewer

1. Thomas Proctor Co., Long Branch, N. J. (contract)	$193,7
2. Joseph Miele Constr. Co., Maplewood, N. J.	214,8

1. Excavation, unclassified	2,000 c. y.	$1.00	$5.
2. Rock excavation	100 c. y.	7.50	2.
3. Timber and lumber	200 M. bm.	90.00	90.
4. Steel sheet piling	10 ton	100.00	100.
5. Wood piles, creosoted	500 l. f.	1.00	2.
6. Pile anchors	100 lb.	.15	
7. 4 to 6-in. underdrains	2,500 l. f.	1.00	1.
8. Crushed stone	350 c. y.	4.00	7.
9. Class A concrete	50 c. y.	30.00	35.
10. Class B concrete	800 c. y.	20.00	20.
11. Steel reinforcement	5 ton	100.00	150.
12. 8-in. vitr. clay pipe, 0 to 6-ft. deep	580 l. f.	1.60	2.
13. 8-in. vitr. clay pipe, 6 to 8-ft. deep	285 l. f.	1.80	2.
14. 8-in. vitr. clay pipe, 8 to 10-ft. deep	600 l. f.	2.00	3.
15. 8-in. vitr. clay pipe, 10 to 12-ft. deep	320 l. f.	2.20	3.
16. 8-in. vitr. clay pipe, 12 to 14-ft. deep	230 l. f.	2.40	5.
17. 8-in. vitr. clay pipe, 14 to 16-ft. deep	140 l. f.	2.60	6.
18. 12-in. vitr. clay pipe, 0 to 8-ft. deep	2,050 l. f.	2.50	3.
19. 12-in. vitr. clay pipe, 8 to 10-ft. deep	3,680 l. f.	4.00	3.
20. 12-in. vitr. clay pipe, 10 to 12-ft. deep	1,575 l. f.	4.20	4.
21. 12-in. vitr. clay pipe, 12 to 14-ft. deep	575 l. f.	4.50	6.
22. 12-in. vitr. clay pipe, 14 to 16-ft. deep	50 l. f.	4.80	6.
23. 15-in. vitr. clay pipe, 0 to 6-ft. deep	770 l. f.	2.00	3.
24. 15-in. vitr. clay pipe, 6 to 8-ft. deep	275 l. f.	2.50	3.
25. 15-in. vitr. clay pipe, 8 to 10-ft. deep	330 l. f.	2.75	4.
26. 15-in. vitr. clay pipe, 10 to 12-ft. deep	270 l. f.	3.00	4.
27. 15-in. vitr. clay pipe, 12 to 14-ft. deep	470 l. f.	5.00	6.
28. 15-in. vitr. clay pipe, 14 to 16-ft. deep	100 l. f.	5.00	7.
29. 18-in. rein. conc. pipe, 0 to 6-ft. deep	140 l. f.	2.25	3.
30. 18-in. rein. conc. pipe, 6 to 8-ft. deep	1,310 l. f.	3.00	4.
31. 18-in. rein. conc. pipe, 8 to 10-ft. deep	1,980 l. f.	4.00	5.
32. 18-in. rein. conc. pipe, 10 to 12-ft. deep	2,450 l. f.	5.00	5.
33. 18-in. rein. conc. pipe, 12 to 14-ft. deep	1,160 l. f.	5.00	7.
34. 18-in. rein. conc. pipe, 14 to 16-ft. deep	950 l. f.	5.50	8.
35. 18-in. rein. conc. pipe, 16 to 18-ft. deep	740 l. f.	6.00	9.
36. 18-in. rein. conc. pipe, 18 to 20-ft. deep	560 l. f.	8.00	10.
37. 21-in. rein. conc. pipe, 0 to 12-ft. deep	800 l. f.	8.00	7.
38. 21-in. rein. conc. pipe, 12 to 14-ft. deep	1,350 l. f.	8.50	8.
39. 21-in. rein. conc. pipe, 14 to 16-ft. deep	490 l. f.	9.50	10.
40. 30-in. rein. conc. pipe, 12 to 14-ft. deep	190 l. f.	9.50	11.
41. Manholes, 0 to 6-ft. deep	15 ea.	65.00	110.
42. Manholes, 6 to 8-ft. deep	15 ea.	75.00	125.
43. Manholes, 8 to 10-ft. deep	25 ea.	85.00	150.
44. Manholes, 10 to 12-ft. deep	16 ea.	90.00	170.
45. Manholes, 12 to 14-ft. deep	12 ea.	95.00	225.
46. Manholes, 14 to 16-ft. deep	8 ea.	100.00	285.
47. Manholes, 16 to 18-ft. deep	3 ea.	125.00	360.
48. Manholes, 18 to 20-ft. deep	1 ea.	150.00	475.
49. 8x4-in. vitr. clay wyes	50 ea.	2.00	2.
50. 12x4-in. vitr. clay wyes	70 ea.	3.00	3.
51. Inverted siphon	L. S.	4,000.00	2,000.
52. Railroad crossing	L. S.	1,500.00	2,000.
53. Connections to exist. sewers	L. S.	420.00	200.
54. Moving garages	L. S.	800.00	2,000.
55. Sidewalk replacement	2,000 s. f.	.30	
56. Curb replacement	600 l. f.	1.25	1.
57. Pavement replacement	24,000 l. f.	1.00	

SEWER, NEW JERSEY

OWNER: Town Council, Bloomfield, N. J.; J. W. Obreiter, town engineer.

PROJECT: Construction of depressed Supplementary Unio Outlet Sewer beneath Second River, near Mill Street, Belleville, and Walnut Street, Bloomfield, N. J. Length approximately 500 feet, and pipe laid to depth of 15 ft.

CONDITIONS: Contractor to furnish all material. Highway transportation facilities available to site of work. Commo labor rate 87½c. per hour.

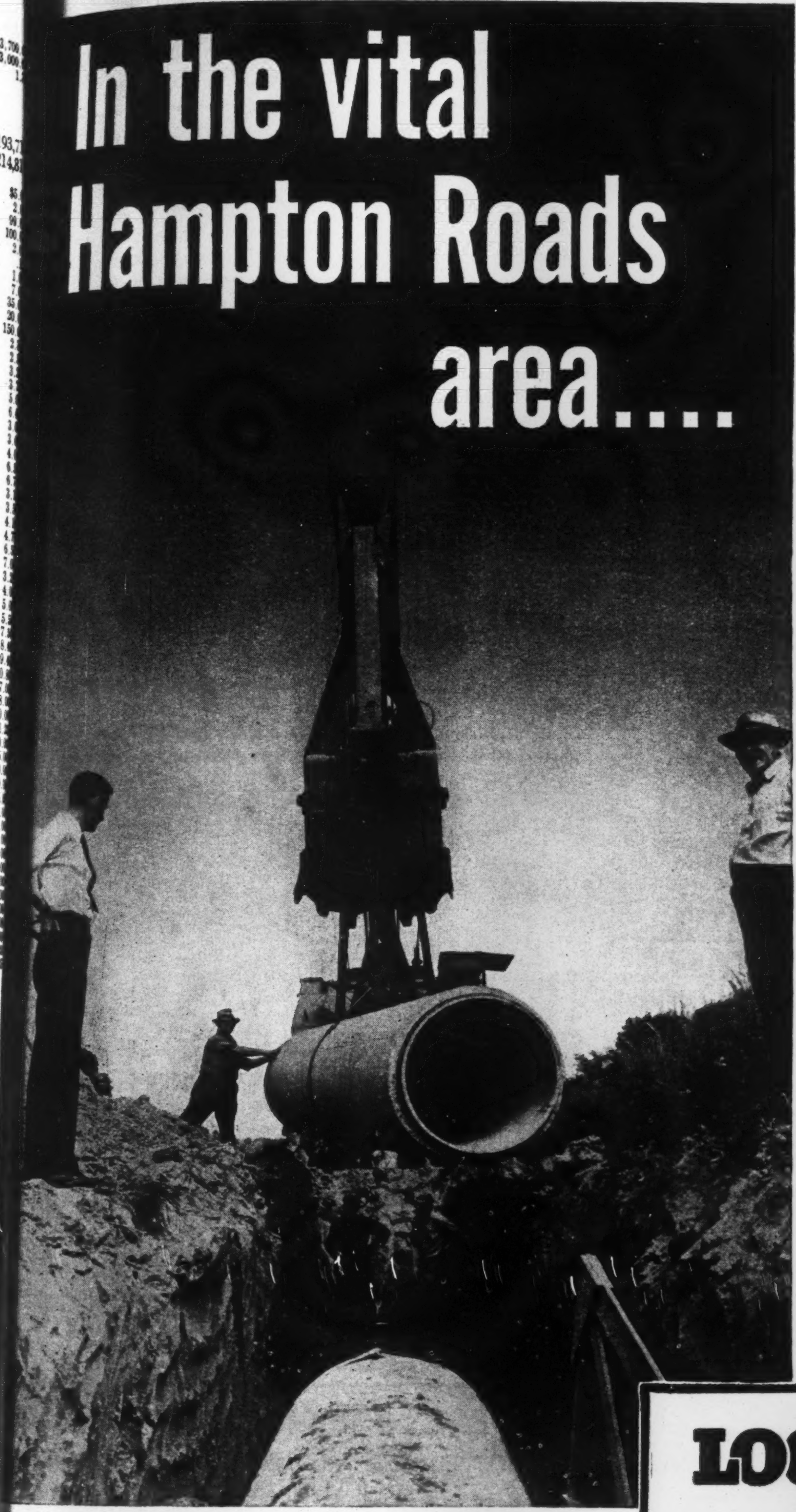
BIDS: Two bids were received November 2, 1942, the contract low of $31,773, and $35,000.

LIST OF BIDDERS:

1. J. R. & M. C. Fusco, Inc., Montclair, N. J. (contract)	$31,773
2. Whippany Construction Co., Hanover, N. J.	35,000

		Unit Prices	
Item	Quan.	(1)	(2)
1. Earth excavation and backfill	1,500 c. y.	$4.50	$6.0
2. Resurfacing, loaming and seeding	310 s. y.	.50	
3. Resurfacing, pavement	20 s. y.	6.00	7.0
4. Class A concrete masonry	300 c. y.	30.00	35.0
5. Class B concrete masonry	150 c. y.	14.00	20.0
6. Steel reinforcement	1,500 lb.	.10	
7. Brick masonry	15 c. y.	20.00	40.0
8. Miscellaneous iron work	3,300 lb.	.10	
9. 30-in. tile-lined depressed pipe	134 l. f.	8.50	8.0
10. 36-in. tile-lined depressed pipe	135 l. f.	9.50	8.2
11. 36-in. unlined rein. conc. pipe	30 l. f.	6.20	5.5

In the vital Hampton Roads area....



• These water supply lines, totaling 82 miles of large diameter pipe, are part of seven Federal Works Agency water works projects installed at Hampton Roads, Virginia.

Lock Joint Solves Strategic Pipeline Problems

Threat of a serious water shortage—caused by an influx of thousands of war workers and military and naval personnel into the Hampton Roads area—has been eliminated with the completion of 82 miles of Lock Joint Pipelines serving vital war projects.

Reinforced Concrete Pressure Pipe, "tailor-made" to fit the job, not only meets all the requirements of durability, efficiency and performance, but also permits savings of from 25% to 75% in critical war materials.

* * *

Whether your project is large or small, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

LOCK JOINT PIPE COMPANY
Established 1905
AMPERE, NEW JERSEY
enver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill.
hite Plains, N. Y. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

COPE OF ERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

12. 54-in. unlined rein. conc. pipe	100 l. f.	8.60	11.00
13. 60-in. unlined rein. conc. pipe	100 l. f.	10.95	11.50
14. Rock excavation	600 c. y.	4.50	5.60
15. Lumber, left in place	5 M bm.	125.00	120.00
16. Connections to existing sewers	Lump Sum	2,000.00	1,250.00
17. Cleaning up	Lump Sum	200.00	300.00
18. Remove river crossings	Lump Sum	2,000.00	1,250.00

RAIL REMOVAL AND RESURFACING STREETS, SEATTLE, WASH.

OWNER: Board of Public Works, Seattle, Wash.; C. L. Wartelle, city engineer.

PROJECT: Removing street railway tracks, and resurfacing Fremont Avenue and North 34th Street, Seattle, Wash. Length of rail to be removed is 30,160 feet.

CONDITIONS: Contractor to furnish all materials and complete work in 60 days. Rail and water transportation facilities available to the city, and highway at site of work. Wage rates are: skilled labor, $2.00 per hour; semi-skilled, $1.50; and common, $1.10. No priority rating needed for job. Certificate of necessity granted for necessary asphalt.

BIDS: Only one bid was received on September 17, 1942, from Argentieri & Colarossi, Seattle, Wash. The amount was $29,983. Awarded to above company.

UNIT BID PRICE

Item	Quan.	Unit Price
1. Remove asphalt or brick surfacing	15,550 s. y.	$0.50
2. Remove street railway rails	30,160 l. f.	.15
3. Furn. Class "1.25" concrete for variable thickness pavmt. on existing base	117 c. y.	8.00
4. Constr. concrete pavement, variable thickness, on existing base	550 s. y.	.55
5. Concrete base in rail voids	140 c. y.	8.00
6. Concrete base, variable thickness	2,150 c. y.	8.00
7. Adjust manholes, etc.: covers	22 ea.	7.00
8. Adjust monument cases	1 ea.	7.00
9. Monument cases	14 ea.	20.00

TRACK REMOVAL, STREET REPAIRS SEATTLE, WASH.

OWNER: City of Seattle, Wash. C. L. Wartelle, city engineer.

PROJECT: Removing street railway tracks, repairing, and restoration of First Avenue and First Avenue, South, from Denny Way to Atlantic Street in Seattle, Wash. Work to be carried on center of street with heavy traffic being maintained on both sides throughout the day.

CONDITIONS: Contractor to furnish all materials and complete project in 90 days. Rail and water transportation available to city, and highway to site of work. Wage rates are: skilled labor, $2.00 per hour; semi-skilled, $1.50; and unskilled, $1.10.

BIDS: Three bids were opened August 6, 1942, ranging from the contract low of $88,221 to $94,580.

LIST OF BIDDERS:

1. T. Romano, Seattle, Wash. (contract)	$88,221
2. Argentieri & Colarossi, Seattle, Wash	91,409
3. M. Moschetto, Seattle, Wash	94,580

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove asphalt or brick surfacing	27,800 s. y.	$0.50	$0.40	$0.45
2. Remove street railway tracks	54,000 l. f.	.15	.25	.25
3. Concrete base in rail voids	415 c. y.	7.75	8.00	7.75
4. Concrete base, variable thickness	3,130 c. y.	8.00	8.00	8.00
5. Adjust granite curb	200 l. f.	1.50	2.00	1.00
6. Fir timber, bolted to exist. granite curb	50 l. f.	1.00	1.00	3.00
7. Replace concrete sidewalks	50 s. y.	2.00	2.00	2.00
8. Filling catch basins	4 ea.	5.00	10.00	10.00
9. Adjust manholes, covers, etc	62 ea.	8.00	10.00	10.00
10. Adjust monument cases	10 ea.	8.00	10.00	10.00
11. Monument cases	23 ea.	20.00	20.00	15.00

EARTHWORK AND TUNNEL TUCUMCARI PROJECT, N. M.

OWNER: U. S. Bureau of Reclamation, Tucumcari Projec New Mexico.

PROJECT: Earthwork canal and construction of Tunnel No. from Station 1603+75 to Station 1684+68 on the Concha Canal, Tucumcari Project, New Mexico, located 12 to 15 mile northwest of Tucumcari, N. M. Earth canal runs from Statio 1603+75 to Station 1607+54, and from Station 1679+36 t Station 1684+68. Tunnel construction, including portal structures and transitions begins at Station 1607+54 and runs t Station 1679+36. Typical tunnel section is supported by timbers and lined with 6-in. concrete lining. A coat of pneumatically applied mortar is required in some portions of the tunne to prevent spalling or disintegration of excavated surfaces

CONDITIONS: Contractor to furnish all permanent timbering; temporary tunnel timbering; materials used for filling spaces outside of permanent timber lagging in tunnel; grave or broken rock for backfill around drain pipes; form materials; wire, wire ties and other securing appliances; temporary supports; water; calking materials; backfill material; rock, rock spalls, gravel and crushed rock for dry-rock paving; and othe miscellaneous materials not part of completed structure necessary for completion. Government to furnish all other materials These will be delivered to railroad siding at Tucumcari and contractor is required to transport to site of work. Time for completion, 750 calendar days. Temporary construction roads are available. Wage rates are: skilled labor, $1.00 to $1.50 per hour; semi-skilled, 55c. to $1.00; and common, 50c.

BIDS: Two bids were received October 6, 1942, the contrac low of $752,205, and $838,350.

LIST OF BIDDERS:

1. Bressi-Bevanda Constructors, Inc., Los Angeles, Calif. (contract)	$752,205
2. J. F. Shea Co., Inc., Los Angeles, Calif	838,350

Item	Quan.	Unit Price (1)	(2
1. Excavation, common, for canal	17,000 c. y.	$1.25	$0.9
2. Excavation, rock, for canal	51,000 c. y.	1.25	.9
3. Remove loose rock above canal	300 c. y.	1.25	2.0
4. Excav., common, for tunnel outlet drain	50 c. y.	1.25	2.0
5. Excav., rock, for tunnel outlet drain	50 c. y.	1.25	5.0
6. Excavation, all classes, in tunnel	42,000 c. y.	9.50	13.4
7. Backfill	500 c. y.	1.25	1.0
8. Puddling or tamping backfill	200 c. y.	1.25	1.0
9. Concrete in tunnel lining	11,000 c. y.	14.00	11.5
10. Conc. in portal structures and transitions	210 c. y.	39.00	35.0
11. Pneumatically applied mortar	300 c. y.	50.00	30.0
12. Placing reinforcing bars	20,000 lb.	.09	.0
13. Furn. and erect permanent timbering in tunnel	600 M bm.	140.00	100.0
14. Drill grout holes, to 10-ft. depth or less	400 l. f.	.50	1.0
15. Place grout pipe and connections	200 lb.	.20	.2
16. Pressure grouting	800 c. f.	.50	1.0
17. Constr. 6-in. tunnel drain	1,800 l. f.	.50	1.5
18. Lay 6-in. sewer pipe with cemented joints	1,000 l. f.	.50	1.0
19. Dry-rock paving	300 s. y.	6.00	3.0

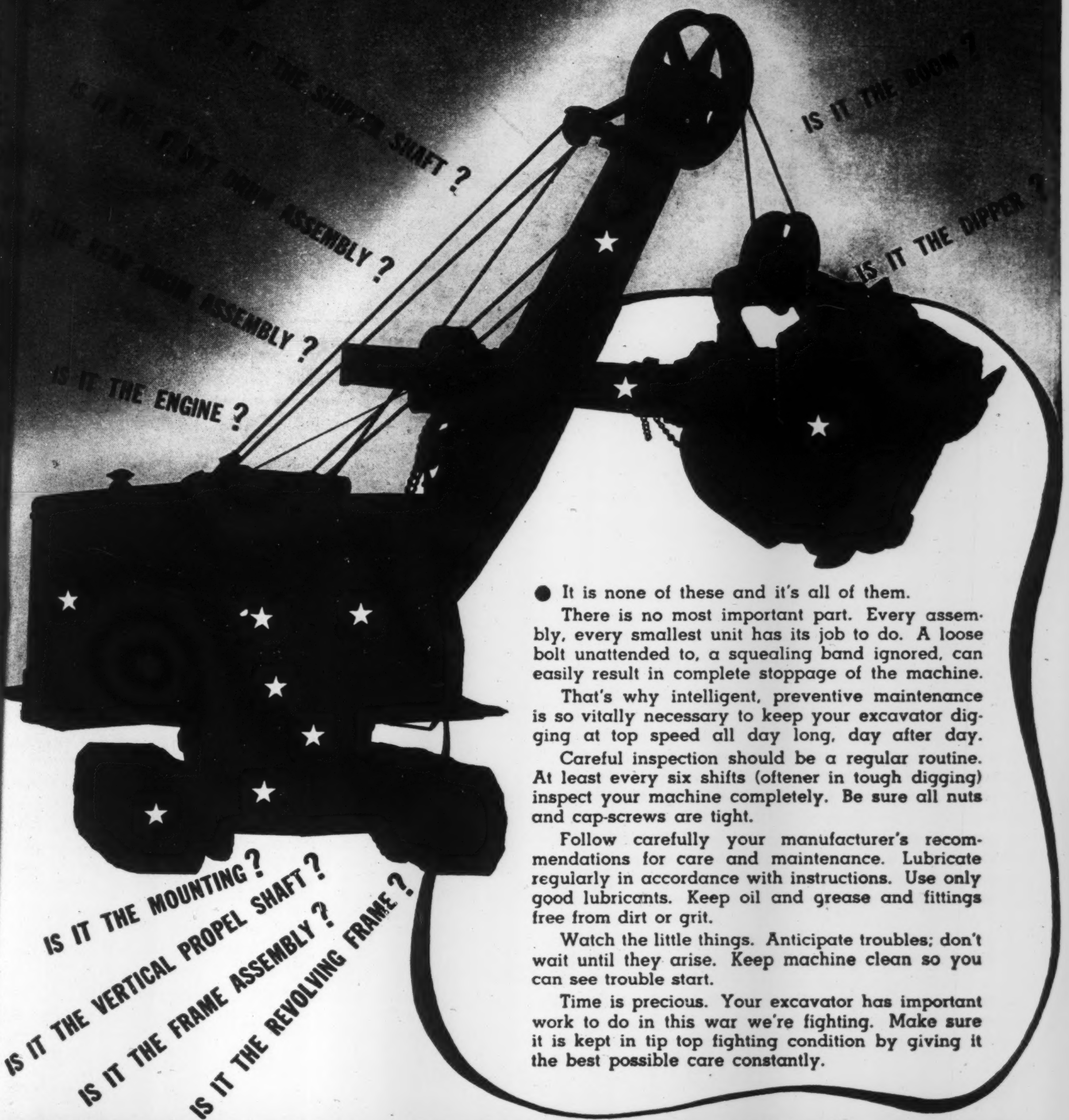
PEDESTRIAN PASSAGEWAYS SUBWAY, CHICAGO

OWNER: City of Chicago, Dept. of Subways and Superhighways.

PROJECT: Finishing pedestrian passageways and access mezzanines (Contract 5-A) for State Street Subway in Chicago, Ill. Includes furnishing and placing colored concrete for floors, landings, bases, stairs, and base for stairs; Class A concrete; non-slip treads; straight and curved structural glass for walls; terra cotta trim; glazed wall tile, etc.

CONDITIONS: Contractor to furnish all materials and complete work in 150 calendar days. Rail and highway transportation facilities available. The project, when completed will provide access to State Street Subway via the Dearborn

What is the Most Important Part *of an* Excavator?


IS IT THE SHIPPER SHAFT ?
IS IT THE FRONT DRUM ASSEMBLY ?
IS IT THE REAR DRUM ASSEMBLY ?
IS IT THE ENGINE ?
IS IT THE BOOM ?
IS IT THE DIPPER ?
IS IT THE MOUNTING?
IS IT THE VERTICAL PROPEL SHAFT?
IS IT THE FRAME ASSEMBLY?
IS IT THE REVOLVING FRAME?

● It is none of these and it's all of them.

There is no most important part. Every assembly, every smallest unit has its job to do. A loose bolt unattended to, a squealing band ignored, can easily result in complete stoppage of the machine.

That's why intelligent, preventive maintenance is so vitally necessary to keep your excavator digging at top speed all day long, day after day.

Careful inspection should be a regular routine. At least every six shifts (oftener in tough digging) inspect your machine completely. Be sure all nuts and cap-screws are tight.

Follow carefully your manufacturer's recommendations for care and maintenance. Lubricate regularly in accordance with instructions. Use only good lubricants. Keep oil and grease and fittings free from dirt or grit.

Watch the little things. Anticipate troubles; don't wait until they arise. Keep machine clean so you can see trouble start.

Time is precious. Your excavator has important work to do in this war we're fighting. Make sure it is kept in tip top fighting condition by giving it the best possible care constantly.

Bucyrus-Erie employees have accepted the award of the Army-Navy "E" as a challenge to keep production rising. ★ ★

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Street Subway. Wage rates are: skilled labor, $1.70 to $1.825 per hour; and common labor, $1.10 per hour.

BIDS: Seven bids were opened November 27, 1942. (Re-advertisement of bids rejected in opening of November 16th.) Bids ranged from the low of $87,748 to $100,016.

LIST OF BIDDERS:

1. C. E. Carson Co., Chicago, Ill. (low bidder)	$87,748
2. G. Kehl Sons, Chicago, Ill.	89,700
3. W. E. O'Neil Constr. Co., Chicago, Ill.	91,110
4. Consolidated Construction Co., Chicago, Ill.	91,624
5. John Traff, Chicago, Ill.	91,975
6. Gerhardt F. Meyne Co., Chicago, Ill.	95,970
7. Morris Handler Co., Inc., Chicago, Ill.	100,016

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Colored concrete floors and landings	14,500 s. f.	$0.688	$0.70	$0.67
2. Colored concrete base	2,100 l. f.	.80	.80	.80
3. Colored concrete stairs	1,400 l. f.	2.28	2.25	2.35
4. Colored concrete base for stairs	620 l. f.	2.00	2.00	2.00
5. Class A concrete	Lump Sum	4,290.00	3,500.00	3,100.00
6. Non-slip treads	850 s. f.	2.58	2.00	2.80
7. Straight structural glass for walls	1,450 s. f.	2.98	2.90	3.10
8. Curved structural glass for walls	750 s. f.	3.70	3.65	4.00
9. Terra cotta trim	650 s. f.	7.00	7.75	8.20
10. Glazed wall tile	15,000 s. f.	1.68	1.65	1.65
11. Wooden doors, metal frames and hardware	Lump Sum	2,744.00	1,500.00	1,530.00
12. Marble for columns	Lump Sum	1,425.00	1,500.00	1,575.00
13. Street railings	Lump Sum	12,887.00	14,000.00	14,350.00
14. Plywood barricades and timber stairs	Lump Sum	2,400.00	2,000.00	1,375.00
15. Handrail	Lump Sum	1,548.00	1,300.00	2,000.00
16. Misc. iron castings and steel	Lump Sum	1,784.00	2,400.00	2,700.00
17. Electrical work	Lump Sum	1,977.00	3,700.00	2,750.00
18. Reconstruct timber street stair entrance and wood decking over station stairwells of Dearborn St. subway	Lump Sum	1,870.00	2,500.00	3,700.00
19. Insulate house drains through vent shafts of State St. and Dearborn St. subways	Lump Sum	1,696.00	1,700.00	2,150.00

SUBWAY, CHICAGO

OWNER: City of Chicago, Dept. of Subways and Superhighways.

PROJECT: Construction of concrete portal structure, remodeling of existing elevated structure, and appurtenant work at south end of State Street Subway (Contract S-1B) in connection with joining of subway and elevated structures. Junction of subway and elevated line of Chicago Rapid Transit Co. is near 13th St. in Chicago.

CONDITIONS: Contractor to furnish all materials except structural steel and complete work in 160 calendar days after start of construction. Partially financed by PWA funds. Highway and water transportation facilities available. Wage rates are: skilled labor, $1.62½ to $2.00 per hr.; semi-skilled, $1.10 to $1.70; and common, $1.02½.

BIDS: Four bids were received April 23, 1942, ranging from the contract low of $696,160 to $749,598.

LIST OF BIDDERS:

1. Kenny Constr. Co., Chicago, Ill. (contract)	$696,160
2. Paschen Contractors, Inc., Chicago, Ill.	736,032
3. G. Kehl Sons, Chicago, Ill.	739,760
4. Michael J. McDermott & Co., Chicago, Ill.	749,598

		Unit Prices		
Item	Quan.	(1)	(2)	(3)
1. Earth excavation	15,000 c. y.	$6.00	$4.12	$5.00
2. Remove exist. column footings	300 c. y.	15.00	12.88	17.00
3. Sand backfill	7,500 c. y.	1.75	2.12	1.90
4. Class A concrete	1,450 c. y.	17.00	15.46	15.00
5. Class B concrete	2,600 c. y.	22.00	20.62	20.00
6. Sub-piers	23,000 c. f.	2.00	1.83	2.50
7. Reinforcement steel	730,000 lb.	.06	.0515	.05
8. Shoring exist. elevated struct	L. S.	60,000.00	90,478.38	100,300.00
9. Raising exist. elevated struct	L. S.	11,980.00	17,395.00	20,000.00
10. Remove, relocate exist. track stringers and stringer bracing	60 tr. spans	600.00	837.50	550.00
11. Erect new struct. steel (furnished)	1,075 ton	77.00	103.00	80.00
12. Furn. and erect. misc. new struct. steel	5,000 lb.	.10	.19	.20
13. Steel plate seal	200 l. f.	1.25	1.60	1.50
14. Ornamental iron fence	30,000 lb.	.15	.1772	.15
15. Bitum. pavement with conc. base	200 s. y.	3.25	5.80	4.10
16. Bitum. pavement with macadam base	1,400 s. y.	2.40	4.51	2.75
17. Concrete pavement	6,000 s. y.	3.00	3.80	
18. Sidewalks, curbs and gutters	3,800 c. f.	1.00	1.03	
19. Premolded joint filler	4,200 s. f.	.25	.19	
20. 10-in. vitr. tile drain	670 l. f.	1.70	1.93	
21. Painting structural steel	L.S.	14,600.00	15,462.00	
22. Fill concrete	50 c. y.	10.00	10.00	
23. Rock excavation	50 c. y.	5.00	5.00	
24. Grout for stopping leaks	50 bbl. cem.	10.00	10.00	
25. Partial removal and support of remainder of Bldg. 1	L.S.	1,400.00	257.00	
26. As above, Building 2	L.S.	2,000.00	322.00	
27. As above, Building 3	L.S.	700.00	129.00	
28. Support and rehabilitation of Bldg. 4	L.S.	2,700.00	2,190.00	
29. Emergency exit doors and misc. steel	3,200 lb.	.28	.31	
30. Misc. iron castings	15,000 lb.	.15	.22	
31. Bell and spigot cast iron pipe, over 12-ft. long	18,000 lb.	.09	.10	
32. B. & S. cast iron pipe, from 3 to 12-ft long	14,500 lb.	.10	.115	
33. B. & S. c. i. pipe, under 3-ft., and fittings	7,500 lb.	.13	.154	
34. Electr. work for subway portal	L.S.	10,000.00	6,584.00	
35. South portal interlocking tower (non-PWA)	L.S.	26,000.00	24,458.00	
36. Sub-piers for interlock. tower (non-PWA)	3,700 c. f.	2.00	1.99	
37. Wooden handrail (non-PWA)	1,200 l. f.	1.25	1.41	
38. Remove, install track and spec. trackwork (non-PWA)	L.S.	64,000.00	64,015.00	
39. Reconstruct power distrib. system	L.S.	33,000.00	32,933.00	
40. Signal system	L.S.	11,100.00	11,101.00	
41. Maintain exist. communication sys	L.S.	4,540.00	4,565.00	
42. Misc. electrical work	L.S.	2,800.00	2,805.00	

PEDESTRIAN SUBWAY APPROACHES CHICAGO, ILL.

OWNER: City of Chicago, Department of Public Works, O Hewitt, commissioner.

PROJECT: Pedestrian subway approaches on North Og Ave., between North Olmsted and North Avondale Aven Involves necessary common and rock excavation; filling (sand and crushed limestone); construction of concrete reta ing wall; damp-proofing; tile pipe sewer and drain; manh and catchbasin; handrail; tree and stump removal; and co crete walkway and sidewalks. Walkway is 12-ft. wide and h 7½-ft. minimum vertical clearance under tracks.

CONDITIONS: Contractor to furnish all materials and co plete work in 210 consecutive days. Rail and highway tra portation facilities available. Wage rates are: skilled lab $1.70 to $1.825 per hour; and common labor, $1.10 per ho

BIDS: Fifteen bids were received January 29, 1943, rang from the low of $12,063 to $29,480.

LIST OF BIDDERS:

1. Santucci Constr. Co., Skokie, Ill. (low bidder)
2. James A. Sackley Co., Chicago, Ill
3. Izzi Constr. Co., Chicago, Ill
4. M. J. McDermott & Co., Chicago, Ill
5. Michuda Bros. Constr. Co., Chicago, Ill
6. George P. Cullen, Chicago, Ill
7. John A. McGarry & Co., Chicago, Ill
8. Casey & Emmert, Chicago, Ill
9. Hoeffer & Co., Chicago, Ill
10. S. N. Nielsen Co., Chicago, Ill
11. Joseph Ventrella & Co., Chicago, Ill.
12. Michael Pontarelli & Sons, Chicago, Ill
13. E. L. Archibald Co., Chicago, Ill
14. C. E. Carson Co., Chicago, Ill
15. N. S. Mackie Co., Chicago, Ill

		Unit Prices	
Item	Quan.	(1)	(2)
1. Common excavation	1,450 c. y.	$1.40	$1.43
2. Rock excavation	20 c. y.	1.00	2.50
3. Filling (sand)	90 c. y.	1.50	2.50
4. Filling (crushed limestone)	300 c. y.	2.10	3.25
5. Retaining wall concrete	220 c. y.	27.00	29.70
6. Concrete walkways and sidewalks	5,200 s. f.	.34	.34
7. Additional portland cement	25 bbl.	2.75	2.70
8. Damp-proofing	200 s. y.	1.00	1.29
9. 8-in. tile pipe sewer	140 l. f.	1.70	2.15
10. 8-in. tile pipe drain	620 l. f.	.75	1.49
11. Manhole	1 ea.	140.00	93.00
12. Catch basin	1 ea.	125.00	93.00
13. Handrail	260 l. f.	1.15	.73
14. Tree and stump removal	150 dia. in.	.03	.90

NEWS OF THE WEEK

(Continued from p. 57)

Survey started to increase Rochester water supply

Plans are under way for an overall rvey of the water system at Rochester, Y., first step of which is to recondition ht miles of abandoned conduit. Robert Horton, widely known hydraulic eneer of Albany, N. Y., has been reined by the city to make the survey, d his first preliminary report has been bmitted.

Reconditioning of the 8 mile, 70-year-l conduit leading down from Hemlock ke to the city, which was abandoned 1935, will be made according to prest plans.

The purpose behind this proposal is increase the reserve capacity of the y's water supply, which last year avaged 32,700,000 gpd, rising to 40,000,0 gal. on exceptionally hot days.

Cost of the proposed reconditioning rk on the conduit is estimated at 00,000.

Engineer Horton has been making me preliminary studies of the problem its entirety for some time and a -ordinated plan for the city's water stem will be submitted when the final rvey work has been completed.

• • •

War essentiality governs building approval

Among the types of projects which ten divert materials, equipment and anpower from direct war work, and hich have been ordered deferred by e War Production Board until after e war, are many highways, waterworks, wage, housing, hospitals, schools, office ildings, flood control, river and harbor nprovements, irrigation projects, recreion and other similar works. Many civil nprovements which were justified in deession days were found to be totally nwarranted in wartime, and were orered deferred. Industrial construction as closely examined and where projects nposed conflicting demands on the war fort, they were deferred.

In all cases the criterion for approval construction has been basically that essentiality to the war program. If e work is necessary, it is approved; it is unnecessary, it is disapproved. applying the criterion no narrow defiition of essentiality has been used, acrding to the War Production Board. Each project is examined in the light its individual contribution. For ex-

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MICROTOMIC "VAN DYKE" DRAWING PENCILS are made with flat, wide, rectangular-shaped leads for easy, fast chisel points, as well as the conventional round shape. This rectangular-shaped lead saves time, adds 20% more lead surface in contact with the paper. That means additional lineage, less wear-away, and smooth, even lines of unvarying width.

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37 Greenpoint Ave., Brooklyn, N.Y.

Please send me a ______ degree MICROTOMIC "VAN DYKE" with HI-DENSITY Lead.

Name ______

Position ______

Business Address ______

☐ *Round* ______ ☐ *Chisel-Point* ______

IN SERVICE AT HOME AND ABROAD

FOR MORE THAN 30 YEARS, McCracken Concrete Pipe Machines have helped solve sanitation problems and have contributed to industrial progress all over the Western Hemisphere. Today there are 72 McCracken plants in the United States and 27 plants in Latin America.

McCRACKEN Machines Make: Soil Pipe—Drain Tile—Culvert Pipe—Conduit. Either plain or reinforced. 4" thru to 36".

1. At the Highest Speed
2. Of the Highest Quality
3. At the Lowest Cost
4. In Any Location

McCRACKEN PIPE

Corrugated

CONCRETE PIPE MACHINERY CO.
• Sioux City, Iowa, U.S.A.

ample, many projects relating to the production and processing of food have been approved because the importance of adequate food supplies for the health of the armed services, the civilian population, and the eventual needs of the inhabitants of occupied countries was clearly recognized as a vital war necessity. On the other hand, many projects for highways and other civic improvements have been disapproved, even though arguments were advanced that manpower, materials, and equipment were available and that the projects could be completed without impeding the war effort.

Already the Facility Review Committee has revoked priority assistance to less essential construction projects having a total value of approximately $1,325,000,000 and has disapproved new projects having an estimated total value of approximately $22,450,000. In addition, the Facility Clearance Board has disapproved new projects having an estimated cost of about $63,000,000. A sharp reduction of applications, moreover, is partly a result of the curtailment campaign and the fact that many agencies now recognize the responsibility of the Facility Review Committee and the Facility Clearance Board in keeping nonessential construction curbed.

• • •

New goal set for home insulation

Manufacture of mineral wool for home insulation in 1943 will exceed the output of any previous year, Wharton Clay, Secretary of the National Mineral Wool Association has announced. He predicts that enough wool will be produced to insulate 600,000 houses, at an average of one ton per house, with potential annual savings of 200,000,000 gal. of fuel oil and 650,000 tons of coal.

These figures are based on the assumption that two-thirds of the homes to be insulated are heated by oil, the remainder by coal, with each ton of mineral wool saving three tons of coal or 500 gal. of oil each heating season.

• • •

Over 100 million barrels of cement for use in 1943

Cement requirements for construction purposes in the continental United States will total approximately 108 million barrels in 1943, according to a preliminary forecast made by the War Production Board.

It is estimated that consumption in the first quarter will have totaled about 32 million barrels. In the second quarter it will be about 36 million, in the

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools. Get your EQUIPMENT-SAVER — FREE

see full page ad page 237

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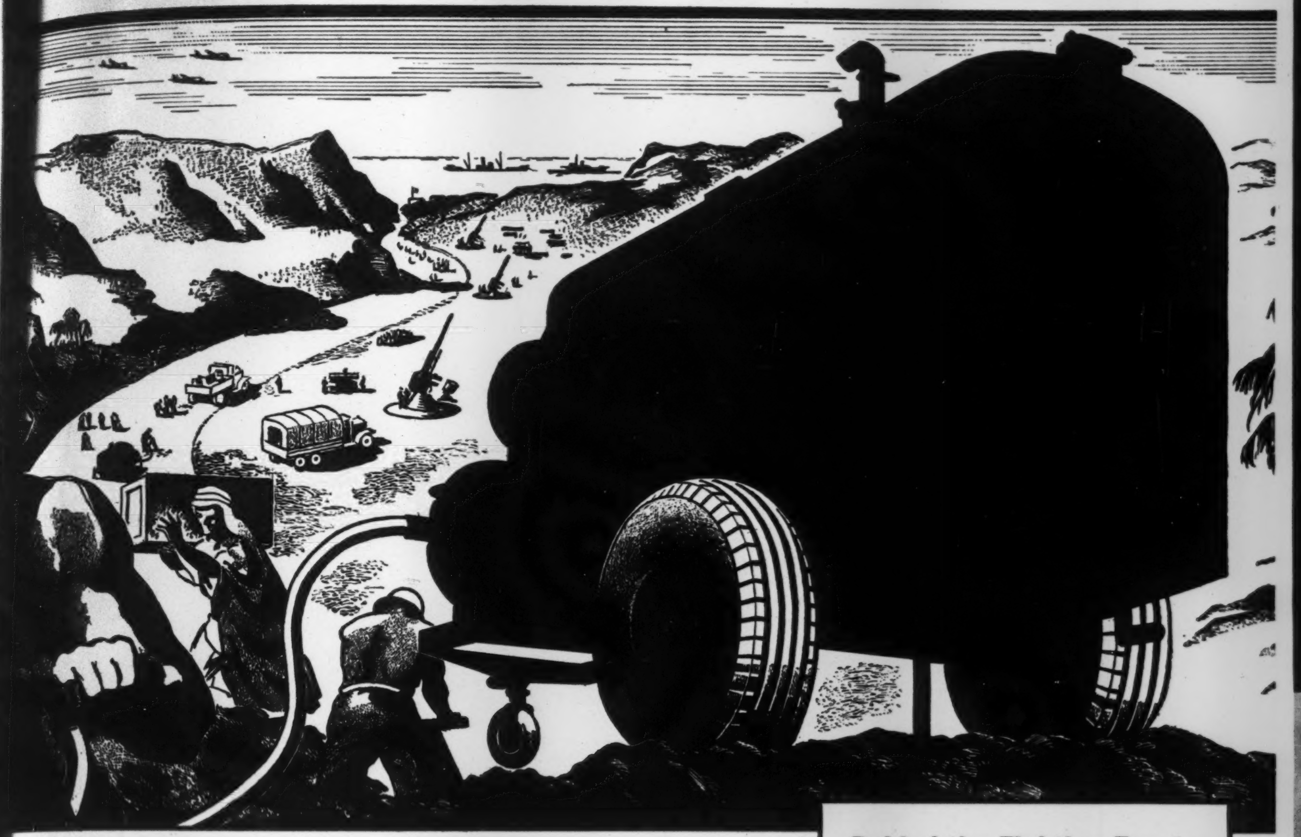
Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Worthington Pump and Machinery Corp.

LUNGS FOR THE 8TH ARMY



ou'll find Blue Brutes are built to the job powered with air through and high water. Many Worthington and 160 cubic foot compressors, el-driven, dressed in uniforms of olive b‡, helped the British 8th Army keep mmel on the run, even before the ks hit Casablanca.

ame your conditions! Blasting an an highway through hardest rock of frozen north or building fortifications der the scorching desert sun — Blue utes will power your air tools with dy, easy breathing!

heir Feather* Valves, strongest and simplest, keep their throats clear for maximum air power, so you save the precious time you're bound to lose when lesser breeds wheeze, cough, and whine for the tool-shed.

Take your pick. Portable or semi-portable — gasolene, diesel or electric driven, ***all save air,*** deliver more air for every power dollar you spend.

Use them with Worthington Rock Drills and Air Tools which ***use less air*** and give you surprising ease of handling for their size and power. Then you'll have an air-power team that spells "more WORTH from air with Worthington!"

Behind the Fighting Fronts with

BLUE BRUTES

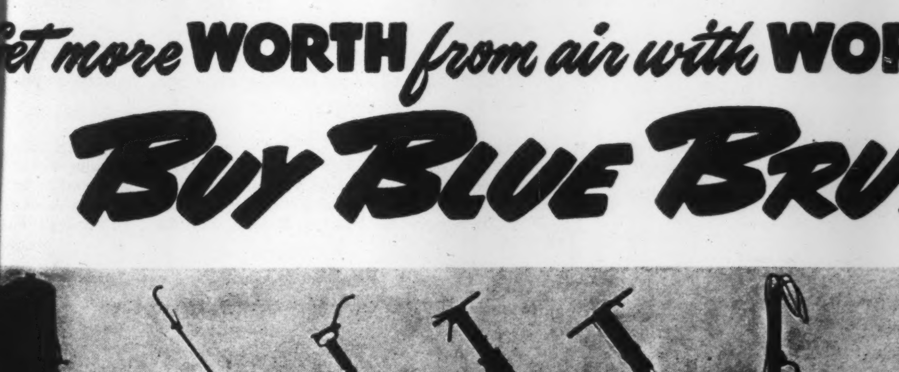
With the "Sea-Bees" and construction companies building bases in the Atlantic and Pacific, "Blue Brutes" in battleship gray‡ are working around the clock. Air power for thousands of industrial operations, as well as construction projects, is provided by Blue Brutes, at work today in hundreds of Army camps, Navy yards, air bases and ordnance plants throughout the country. Your nearest distributor is listed on page 236.

. U. S. Pat. Off.

e Brute Compressors and Air Tools are painted olive drab for the Army and battleship gray for the Navy.

et more WORTH *from air with* WORTHINGTON

BUY BLUE BRUTES



ssors, from 60 to 500 cu. ft. capacity in mount- suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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Worthington Pump and Machinery Cor-
poration, Harrison, N. J. Holyoke Com-
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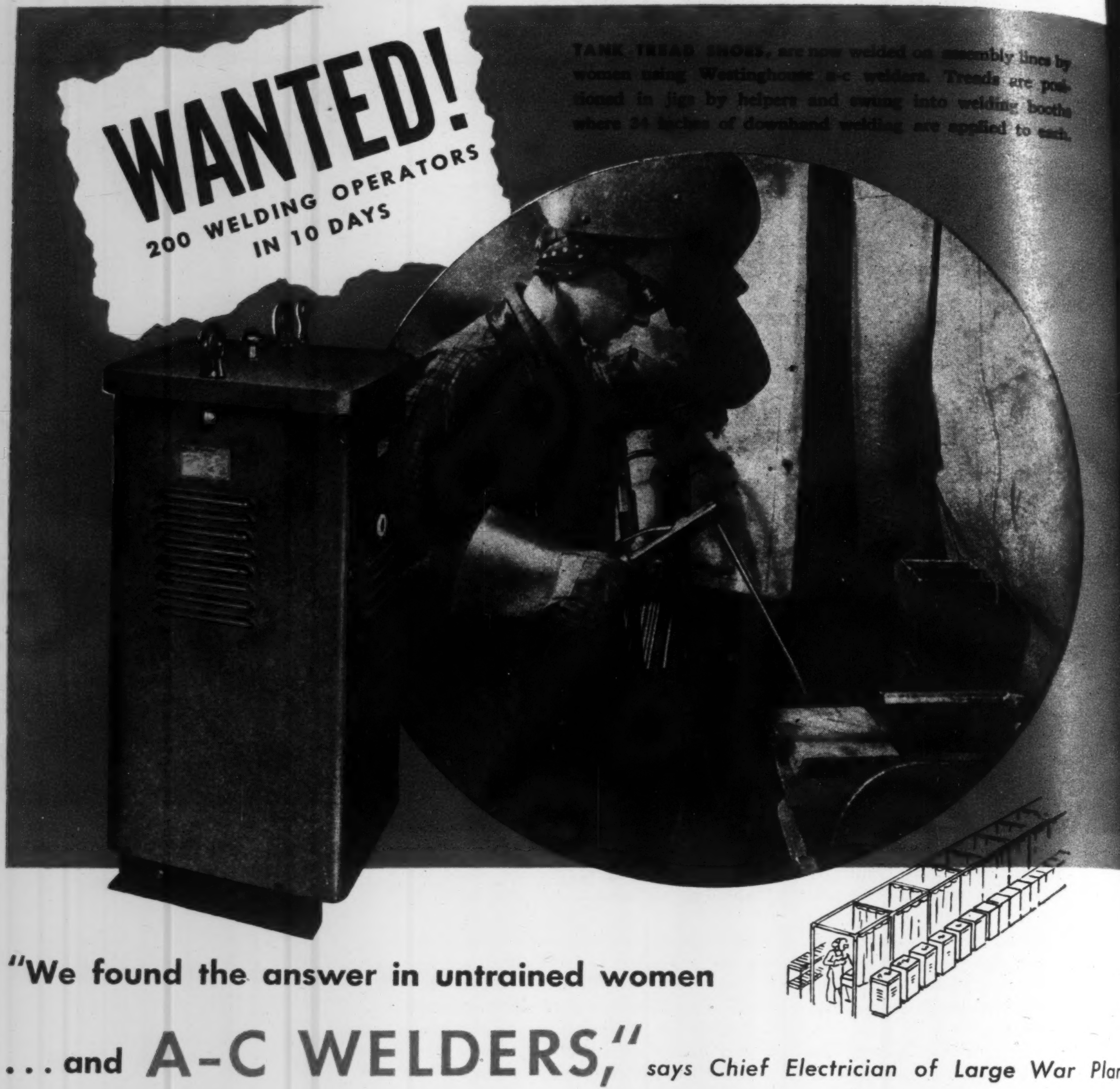


TANK TREAD SHOES, are now welded on assembly lines by women using Westinghouse a-c welders. Treads are positioned in jigs by helpers and swung into welding booths where 34 inches of downhand welding are applied to each.

"We found the answer in untrained women

. . . and A-C WELDERS," *says Chief Electrician of Large War Plant*

"Production-line welding in 10 days by women operators who never struck an arc before? A few days ago we would have thought it impossible. *Today, it's a fact!*"

So states this official, who has supervised the training of more than 600 women welders, for producing tank tread shoes on seven continuous production assembly lines. The average woman worker quickly learns how to strike an arc and run short beads—from then on she practices, practices, practices welding tank tread shoes. Usually in ten days she is ready for actual production welding (work must pass bend tests)—where her initial work is carefully supervised by her instructor.

"One of the biggest factors that has made it possible—and successful," says this electrical engineer, "has been the use of a-c welders. We bought them originally because they were immediately available, although we had always used d-c.

"We found, however, that the freedom from arc blow made it much easier to develop qualified operators. Weld quality is excellent. Most important, we've had literally no maintenance in nearly a year of 24-hour-a-day average operation."

★ ★ ★

The 275 Westinghouse a-c 500-ampere welders in operation at this plant are just a few of the many Westinghouse welders that are solving problems of availability, ease of operation and freedom from maintenance for many war plants. Ask for booklet B-3136. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

J-21269

Westinghouse **A-C WELDERS**

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE quarter approximately 24 million, n the last quarter somewhat under illion barrels.

addition to consumption within the d States, large amounts will be d overseas. As much as possible is cement will be obtained abroad der to save shipping space for guns munitions. However, since some of l come from the United States, the consumption of cement produced in ountry is expected to total approxi- y 110 million barrels in 1943.

• • •

se of gypsum saves rategic materials

ique among materials that are avail- for the purpose of substitution for l and lumber is ordinary gypsum.

ofs constructed of laminated gyp- board are somewhat of an innova- in the engineering and construction . However, this method means only a new use has been found for an product already widely known. In method as well as the more familiar ed-roof construction, the gypsum uately performs structural functions are customarily served by metal and ber elements, one or both.

eather-proofing is applied in the l way on either type of roof. A elled covering on an asphalt base or -up roofing of felt and asphalt or h seals the gypsum surface. Roofs of types may be built either flat or ing up to a 45-degree incline. Gyp- materials are manufactured in two- three-ply and four-ply laminations of ious lengths and widths, generally g ½-in. mill stock. However, lamina- s can be fabricated from stock of any red thickness. Shiplap is obtainable he form of two-ply material made n either ⅜-in. or ½-in. board. gued and grooved flooring board is ther recently developed product. It made in three-ply laminations.

t is said that laminated gypsum board first developed by the National Gyp- Co. of Buffalo, N. Y. These boards made by gluing together ordinary sum wallboards of ½ in. thickness. usual laminated boards are 2 ft. e and 8, 9 or 10 ft. long. The so- lled planks are manufactured in two three ply and four ply laminations. y can also be obtained in various ths and lengths. Tongue and groov- may also be obtained in the three-ply rd by offsetting the center board ut ½ in. along the length of the rd. When glued to the other two rds, this middle board supplies a gue along one edge and a groove g the other.

n the gluing process the glue is ap- d to the boards and they are then placed in racks and pressed together with clamps. After the glue has set, the boards are removed and are ready for shipment after thick paper is placed along the edges of the board. After gluing the boards together, the paper acts as a reinforcement and rather high tensile strength results from the paper being placed in tension and the gypsum filling in compression.

• • •

N. C. highway prison labor not available for farms

The first test of the law passed by the 1943 session of the North Carolina legislature which permits the state highway and public works commission to hire out its prison labor to sections facing a farm labor shortage, has resulted in the highway commission turning down the request on the grounds that its prison labor cannot be spared at this time without seriously interfering with the maintenance of the state highways.

The law allows the highway commission to allocate prison labor to sections where the governor of the state has declared a labor emergency to exist. At the same time it gives the commission the right to deny the use of prison labor on farms if such a step would interfere with highway maintenance.

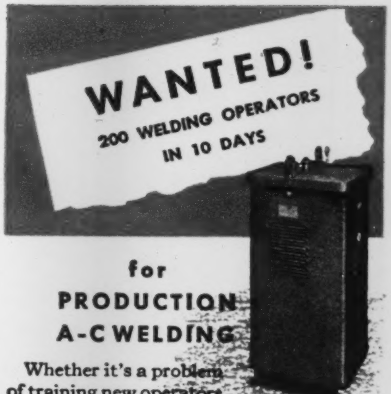
The first request for the use of the highway department's prison labor came from peach orchard operators in Richmond, Montgomery and Moore counties, who declared that they were unable to get labor to spray their orchards because labor usually available in the section was engaged in construction work at the nearby army air base at Hoffman, N. C.

After conferring with the orchard operators, Governor J. M. Broughton of North Carolina declared that a labor emergency existed in the section and recommended that the state highway and public works commission allocate some of its labor to relieve the situation. The commission, however, at a meeting in Raleigh recently, refused to furnish any of its prison labor, stating that it was unable to do so without hampering highway maintenance work because of a 25 percent drop in prison population, and the need for more prison laborers to work increased acreage on prison farms.

• • •

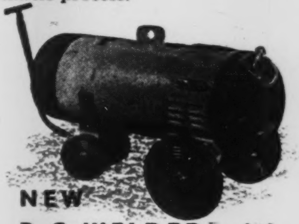
Baltimore votes on new water supply project

Baltimore's prospects for an ample water supply are greatly improved by the agreement recently reached between the city administration and the commission on governmental efficiency and



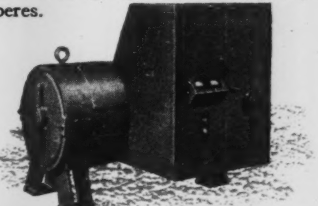
for
PRODUCTION
A-C WELDING

Whether it's a problem of training new operators quickly or of improving present weld quality, Westinghouse a-c welders, with their freedom from arc blow, can help you. 100, 200, 300 and 500-ampere models. Also 1000-ampere models for use with the Unionmelt process.



NEW
D-C WELDER with
ARCONTROL

Single, pre-set current adjustment. Lots of capacity to handle all kinds of work. No drop-off after warming up—less lost motion making adjustments. 200, 300, 400 amperes.



MULTIPLE-OPERATOR SETS

Do the work of 20 to 30 single-operator rotating sets. Stationary types for shop operation—semiportable types for use on shipways and similar applications. Ask for complete data.

PORTABLE
TACKING
PANELS

Compact, single-operator control panels for fit-up work with multiple-operator sets. Extra capacity for light tack welding.

Write for latest literature. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
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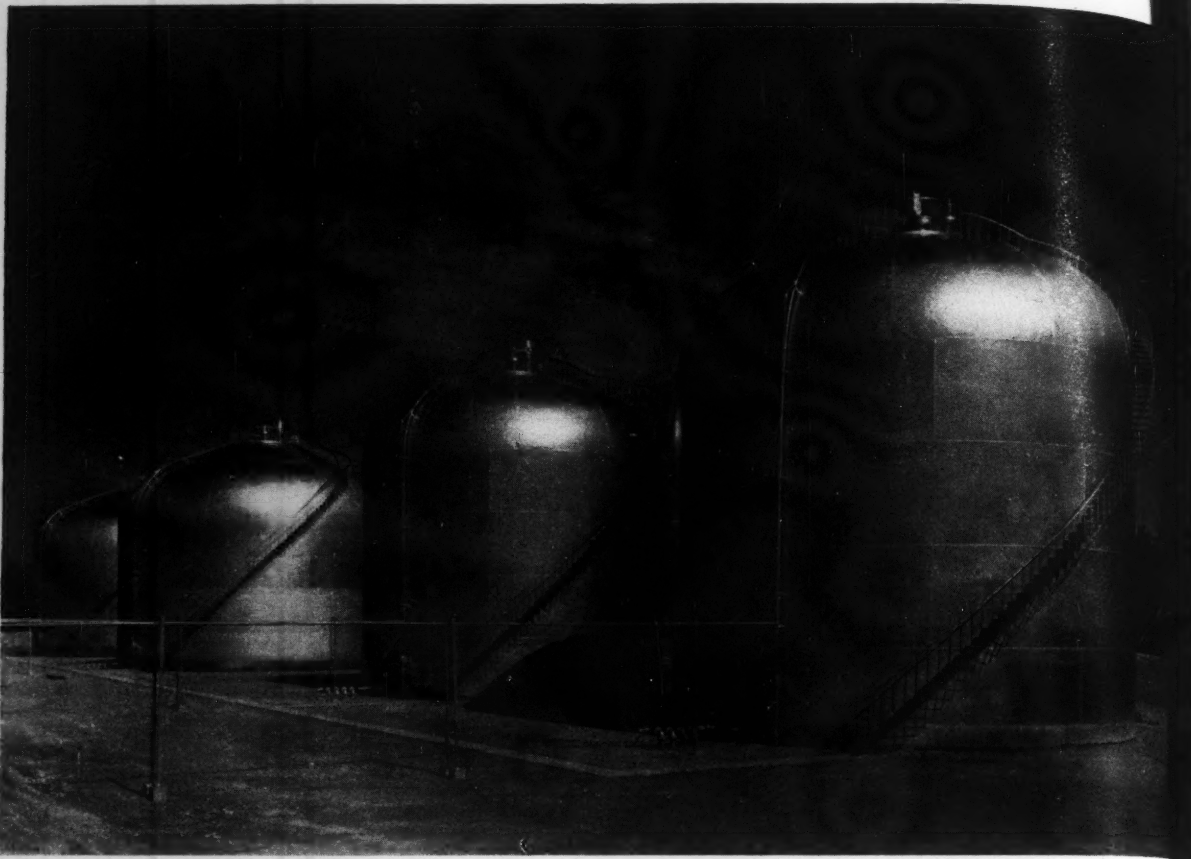
Westinghouse
PLANTS IN 25 CITIES... OFFICES EVERYWHERE
WELDERS

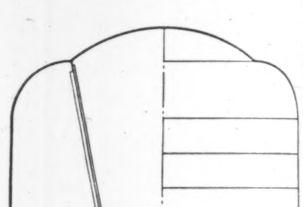


HEMISPHEROIDS reduce evaporation losses by storing volatile liquids under pressure

At first glance, you might think that all four tanks in the above view are the same size. Actually, the two at the left hold twice as much as the two at the right.

There is also an important difference between these tanks and ordinary oil tanks that you might not notice without examining them closely. They have special noded tops and are designed for an internal pressure of 5 lbs. per sq. in. Tanks of this type are used to reduce excessive evaporation losses from volatile liquids. As daily temperature variations tend to expand the air-vapor mixture above the liquid, they permit a pressure to be built up in the vapor space instead of venting vapor to the atmosphere.

These tanks, called Hemispheroids, are built in capacities up to 30,000 bbls. for pressures of 2½ and 5 lbs. per sq. in. Hortonspheres and Hortonspheroids are used for higher pressures and larger sizes.



The four tanks in the above illustration are used to store condensate and gasoline at a Louisiana recycling plant. The two at the left hold 20,000 bbls. each and the other two 10,000 bbls. each. The elevation portion of the above sketch shows how a Hemispheroid looks above the ground and the left half or section illustrates how the noded roof and bottom are tied together to withstand internal pressure.

CHICAGO BRIDGE & IRON COMPANY

Chicago..................2101 McCormick Bldg.
New York..........3311-165 Broadway Bldg.
Cleveland..................2201 Guildhall Bldg.

Philadelphia.....1623-"1700" Walnut St. Bldg.
Tulsa..............................1617 Hunt Bldg.
Birmingham.........1520 North Fiftieth Street

Washington.....................330 Bowen Bld
Houston.....................5609 Clinton Dri
San Francisco.................1020 Rialto Bld

Plants in BIRMINGHAM, CHICAGO, and GREENVILLE, PENNA.

In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ON omy. Under its terms, the voters have an opportunity at the Mayor- election in May to say whether or the city shall proceed with the ex- liture of $12,500,000 in loan funds evelop the Patapsco River water- as a new source of supply.

• • •

inneapolis and St. Paul gree on joint airport

innesota senators and representa- , and officials of Minneapolis and Paul have reached an agreement on ll to be presented in the state legis- re to create a huge joint airport for Twin Cities. The bill provides that airport shall be equally convenient ll parts of the area involved and the l is to be located equi-distant from city halls of the two cities. The bill, assed, will take effect July 6, 1943.

he proposed joint commission for the airport would include four members n each city, with the ninth member be appointed by the governor of the e from a neutral county. Both cities agreed that the commission should e over operation of both Wold-Cham- lain and Holman airports. Wold- mberlain would continue to be used the Twin Cities passenger airport, ile Holman may be used chiefly for ndling air freight for St. Paul.

BRIEF NEWS

Plans are being prepared by the nnsylvania highway department engi- ers for the early removal of thousands tons of rock and shale from the over- nging cliff on the south side of the revorton-Shamokin concrete highway posite the Glen Burn Colliery near revorton. This half-mile strip of high- y is considered one of the most haz- dous in central Pennsylvania and it is e determination of the highway thorities to make it as safe as possible.

Announcement has been made of the tablishment of the Pratt & Whitney ircraft Fellowships to train young omen as engineering aides in six col- ges throughout the country. Awards e to be made to college graduates, niors who will be graduated this June, d to juniors who will follow a partic- ar course of undergraduate study. mong the institutions of higher learn- g which are cooperating are the Uni- rsity of Connecticut, University of ew Hampshire, Bucknell University, niversity of Minnesota, North Carolina tate College and Michigan State Col- ge. (*Continued on next page*)

Cut Costs

with this tough two-purpose hose

GOODALL

"NEWTYPE"

(U. S. Pat. No. 1948410)

SUCTION and DISCHARGE HOSE

Extreme Flexibility: Twelve feet of 3" "Newtype" Hose coiled to a diameter of approximately 30 inches.

Extreme flexibility, combined with superior strength and durability, gives this hose *everything it* takes to withstand the hardest kind of wear and abuse. A heavy, smooth-bore, elastic tube resists the action of abrasives and insures rapid, unchecked flow. Light in weight and easy to handle, it is the ideal hose for this dual service.

An important result of the "Newtype" construction is that, should the hose be crushed by a particularly heavy object, it can be quickly rounded into shape again with a mallet, without damage to tube or carcass. (See unretouched photographs on right.)

Contact our nearest branch or main office for details

WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION

New York. Boston. Chicago. Pittsburgh. Gov't. Dept., Washington, D. C. West Coast: Goodall Rubber Co. of California. Los Angeles. Seattle. San Francisco. Salt Lake City.

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Factory - Trenton, N. J. Est. 1870

73 Years of "Know-How"—Our Most Valuable Commodity

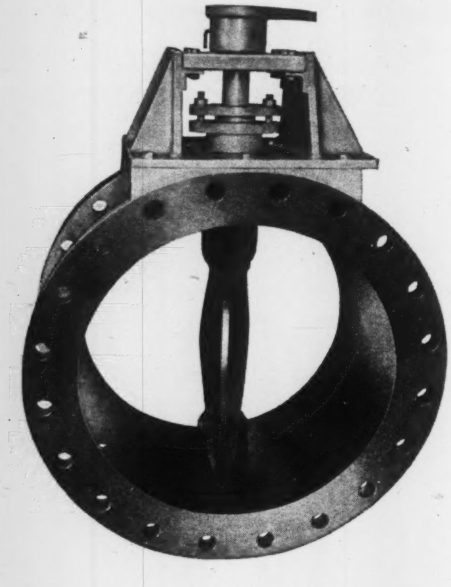
GOODALL

RUBBER COMPANY INCORPORATED

PARTICULARLY
well adapted for
WATER LINES

Low Pressure Loss
When Open

Standard 24-inch 125 lb. iron valve with ball crank arm for connection to extended reach rod. Sleeve bearing lubricated stuffing box with cage. When the vane is fully open, flow conditions are similar to those produced in two Venturi Tubes.



Air diaphragm motor for automatic operation—15 pounds pressure.

The pressure loss in a wide open R-S Butterfly Valve is less than in most conventional types of wedge gates. In fact, the streamlined vane is a Venturi maker and is practically self-cleaning. Any member of the R-S Butterfly Valve line will sting the maintenance bill every time.

These valves are accurately machined and are either manually or automatically controlled. The beveled vane seats at an angle against the valve body. There is a size and type for practically any service condition.

15 to 900 P. S. I.

SUBSTITUTE METALS—R-S has developed pressure iron castings for resistance against heat, abrasion and corrosion. They replace vital victory production metals and are considerably lower in price. For instance, R-S "A" Metal, a tough dense metal of high endurance, is used in applications where hard wear and severe stresses are encountered. Has a tensile up to 50,000 p. s. i. and is readily machinable. Write for detailed information and the R-S Butterfly Valve Catalog.

VALVE DIVISION
R-S PRODUCTS CORPORATION
116 Berkley Street • Philadelphia, Penna.

R-S *Streamlined* BUTTERFLY VALVES

The 48-week training course will co
mathematics, physics, chemistry, en
neering drawing, metallurgy and ind
trial engineering and each fellows
will include tuition, books, fees, ro
and board, laundry and an allowa
for incidental expenses. Pratt & W
ney Aircraft expects to recruit at le
200 young women as trained engine
ing aides as a result of this program

In commending Administrator Pr
tiss M. Brown of the Office of Pr
Administration for his promise to rev
Maximum Price Regulation No. 2
establishing price control over constr
tion, H. E. Foreman, managing dir
tor of the Associated General Contr
tors of America, said: "We believe th
the action of the Office of Price Adm
istration in revoking this regulation is
constructive and realistic step tow
making price control more effective, a
toward freeing the construction indu
try from an unnecessary burden of wo
so that its energies can be devoted co
pletely to war work. Adequate contr
of construction prices will exist witho
the regulation."

The Iowa State Board of Engineer
Examiners will hold its next exami
tion for professional engineering
June 1, 2 and 3, beginning at 9 a.m.
the State House, Des Moines, Iowa.

Lloyd B. Reid, Michigan state hig
way commissioner, says "Nearly 1
miles of our old highways have reach
a point, due to wartime stoppage
normal reconstruction and heavy w
traffic, where they cannot be repair
and must be completely resurfaced. W
have 600 miles of old highways that ne
resurfacing almost as badly, if they a
to continue handling war traffic. That
a $13,000,000 job, and the state gasoli
tax drop-off leaves us without any mon
at all for this work. So we are aski
the federal government to give us t
full amount. There is not enough roa
building equipment left in Michigan
do the work this year but we're trying
get the program set so we can bring
possible relief."

The birthplace of Mary Pickford
Toronto, Ont., is to be torn down to gi
way to a modern $1.250.000 hospital,
be constructed by the Jewish communit

Governor Forrest G. Donnell of Mi
souri recently slashed about $4.000,0
from the six months' appropriation f
the Missouri State Highway Departme
including $3,750.000 for road maint
nance and construction; $90.000 for sa
aries, $134,175 for operations; $3.750
additions and $6,250 for an emergen

BUILT for the Non-Stop Jobs

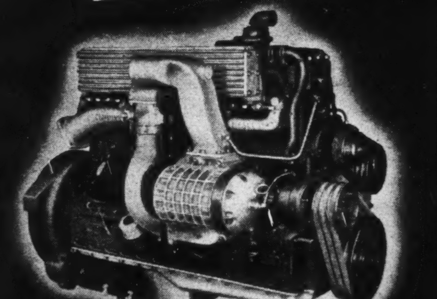
CUMMINS
Dependable
DIESELS

Time means more than money today. Time means victory. That's why every hour is a working hour on the nation's construction front. And that's why—on almost every important defense project in the country—so many Cummins Dependable Diesels are on the job, day and night, seven days a week. . . . Because the "job-test evidence" has proved to leading contractors everywhere that there's no end to the Cummins Diesel's endurance . . . no limit to its ability to deliver full-rated power on a round-the-clock schedule in every heavy-duty service.

Assure uninterrupted operation on your job during the emergency by providing adequate maintenance and service for your Cummins Diesels. Take advantage of the complete parts and service facilities offered by authorized Cummins Dealers in all parts of the country.

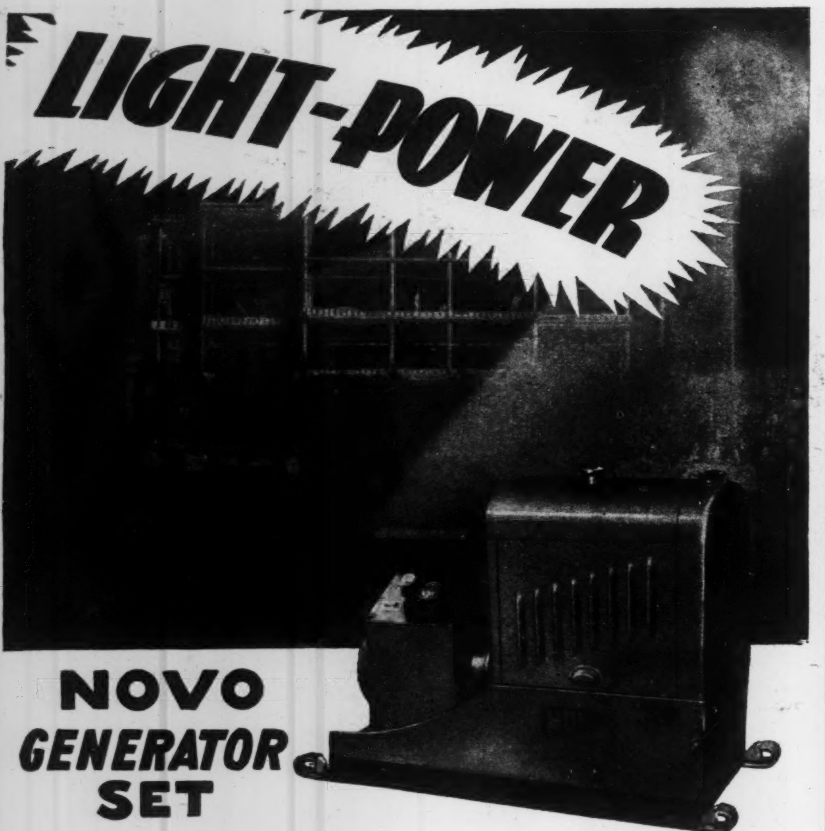
Illustrated at top: *A supercharged Cummins Dependable Diesel powers this Cletrac FDLC tractor with 23-yard Wooldridge Scraper.*

Left, above: *One of the fleet of Cummins Diesel-powered trucks owned by the S. T. Brotemarkle Construction Co.*



Above: Model HBIS-600 (supercharged) Cummins Dependable Diesel. 200 hp. at 1800 rpm. There's no need to sacrifice more weight and space for extra power . . . supercharging gives you the additional horsepower needed in the same dimensions and with very few changes in your service parts requirements.

CUMMINS ENGINE COMPANY • • • COLUMBUS, INDIANA



NOVO GENERATOR SET

On planes, tanks and ships it's "Fire Power"—for fast construction it's "Light-Power" that brings your vital jobs through ahead of schedule.

The Novo Generator Sets or "Light Plants" are powered with heavy duty industrial type engines—simple and fool-proof in construction—no extra gadgets, non-automatic, economical in original cost and operation.

Engines are equipped with efficient governors that hold voltage practically constant. All Novo Engines are antifriction bearing equipped and have extra large fuel tanks and large oil capacities for long periods of operation.

Unfailing LIGHT for night work and POWER for small electric tools. Send for complete information.

FREE INSTALLATION DATA

We have for your use, Installation Data Sheet No. 2002 which gives useful information on the operation and installation of generator sets, how to figure loads and selection of wire, different current characteristics, etc.

FACTORY OVERHAUL OF ENGINE

A factory overhaul for your Novo Engine regardless of the equipment on which it is mounted, Pump, Hoist, Mixer, Light Plant, etc., will make the heart of that equipment practically new and these jobs carry a new equipment guarantee—See your Novo Distributor or write us for full information.

NOVO ENGINE COMPANY,
200 Porter St., Lansing, Michigan

We would like to have complete information on the Novo Light Plants..............
also Free Installation and Performance data..............
Name..
Address..
City..............................State..............................

cash fund. His veto left the departmen appropriation bill with a total of $1 703,750. The Governor explained th he wanted to keep the departmen spending level in line with his o budget.

American-Mexican capitalists rep sented by Walter Hood Bradfield a Lorenzo Cue, and Emilio Lanzagor are arranging with President Man Avila Camacho for the establishment an iron and steel works at Iraqua Gunajuato state industrial and railro center. The plans, which Governor E rique Fernandez Martinez of Guan juato, who is furthering the negotiatio call for an investment of $3,000,000. is expected the plan will be consu mated in 90 days. The plant is to pr duce agricultural implements and hea industrial machinery, railroad rails a wheels for railroad locomotives and ca

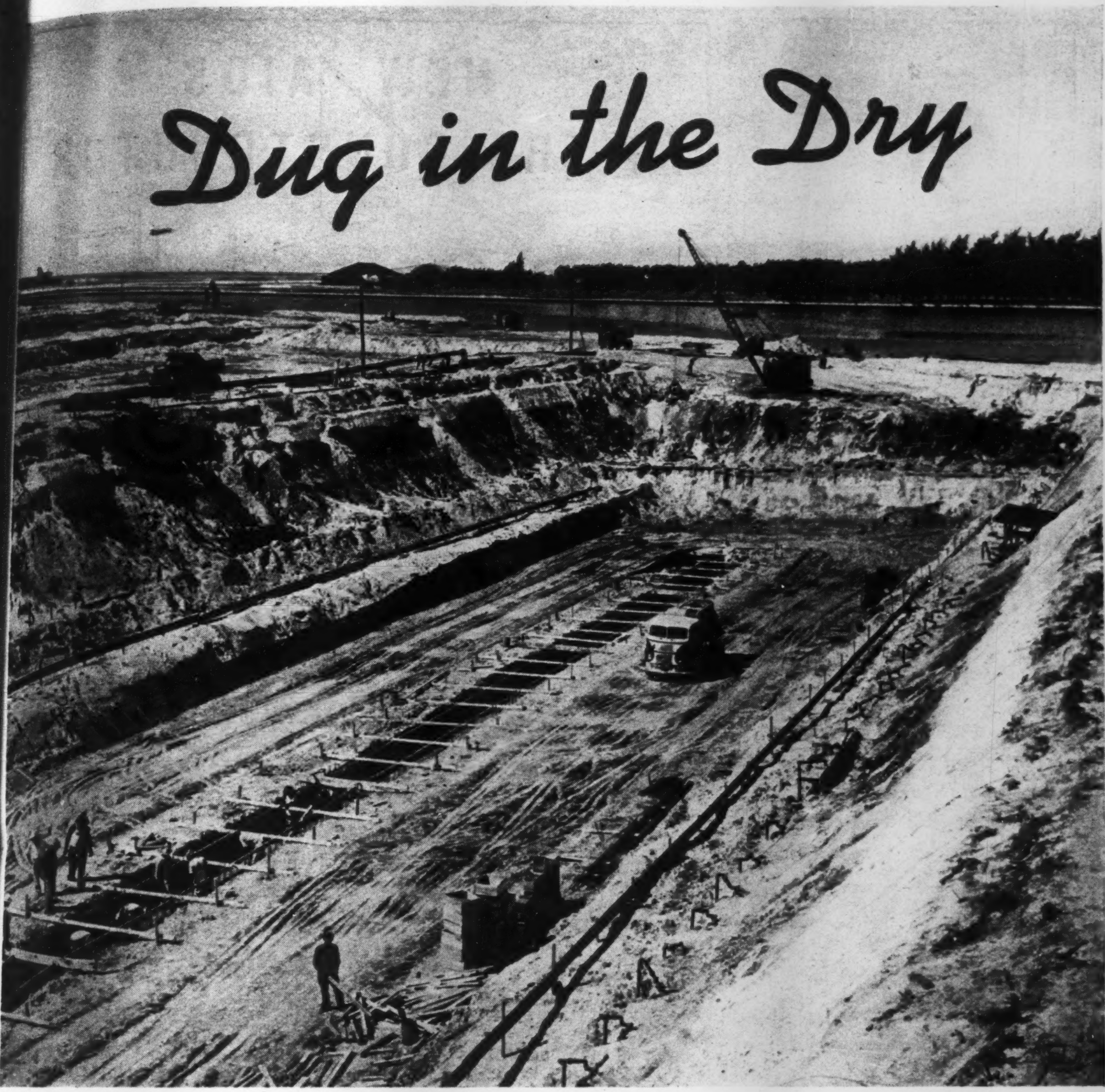
A big war housing project for Jac sonville, Fla., was announced by M. Parrish, state director of Federal Hou ing Administration on March 24. It lows for the construction of 2,600 re dences within six months at a cost approximately $8,000,000. The hou may be built on a monthly schedule 400 each month and will call for expenditure of $1,300,000 a month.

A two-man board of inquiry head by Prof. Malcolm S. Douglas of Ca School of Applied Science has charg that "poor finishing," "excess wate and "poor concrete mix" caused the di integration of the million-dollar Ma field Road and Bulkley Boulevard fre ways in Cleveland, Ohio. Making impartial, independent investigation the request of the Cleveland Pla Dealer, the Douglas board submitted report showing that scaling damage both roads could have been avoided proper preventive measures had be taken in their construction.

A pontoon bridge across the Potom River from the foot of Wisconsin Av to Roosevelt Island, connecting wi Virginia roads, has been completed. is designed to relieve traffic congesti between downtown Washington and th Pentagon building in Arlington Coun

Experiments with foamed slag building purposes have been reported successful at Sydney, N. S. The slag refuse from a large steel plant at Sydne operated by the Dominion Steel Cor The Nova Scotia government has bee showing active interest in the treatme of the slag for use in construction.

Dug in the Dry



Another one of America's gigantic war projects—26′ below water level—bonedried and *kept* that way by a Moretrench Wellpoint System.

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For Speed, Action, and Economy on your wet work—get Moretrench! Results are not only certain—they're Guaranteed!

FOR VICTORY — BUY BONDS!

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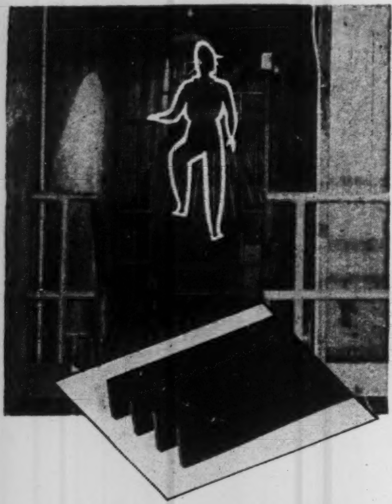

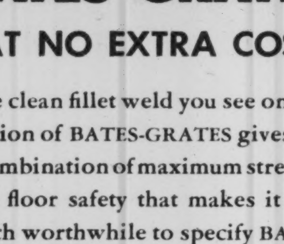

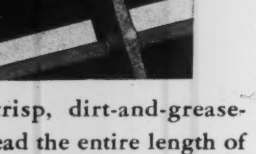

THE EXTRA STRENGTH AND CLEANLINESS OF

BATES-GRATES

AT NO EXTRA COST

The clean fillet weld you see on that section of BATES-GRATES gives you a combination of maximum strength and floor safety that makes it very much worthwhile to specify BATES-GRATES for your open steel flooring.

Note the crisp, dirt-and-grease-shedding tread the entire length of the Hex Cross Bar. BATES, alone, gives you that, too.

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OPEN STEEL FLOORING • STAIR TREADS

NEW AIDS TO THE CONSTRUCTOR

Asbestos Conduit with Flexible Coupling

A new asbestos cement conduit using a special flexible type coupling is claimed by its manufacturers to have several advantages for use in cable installations. The coupling consists of a tubular housing of tough, rigid, asbestos-cement, to which is bonded a liner of mineralized asphalt compound, formed into a barrier-type, tapered liner. It permits a flexible, self-aligning, watertight joint of exceptional quality when properly assembled with a special, joint-sealing compound, states the manufacturer. Employing a non-taper type conduit with the coupling, the field assembly of short lengths of complete duct runs, or the fabrication of radius sweeps for clearing fixed obstructions becomes a simple, inexpensive job. According to the manufacturer, the duct bank will remain watertight even under ground-settling action experienced adjacent to manholes, railroads and highways.

The asbestos cement conduit itself is claimed to have some advantages over war restricted metal conduit in that it is exceptionally tough, stronger and more blow-resistant. The conduit is made in two thicknesses for installation with or without concrete encasement, and it is said to be easily cut on the job, rapidly assembled and economical in construction. Installations may be made by unskilled labor using simple tools.—*The Philip Carey Mfg. Co., Lockland, Cincinnati, Ohio.*

New Decking Material

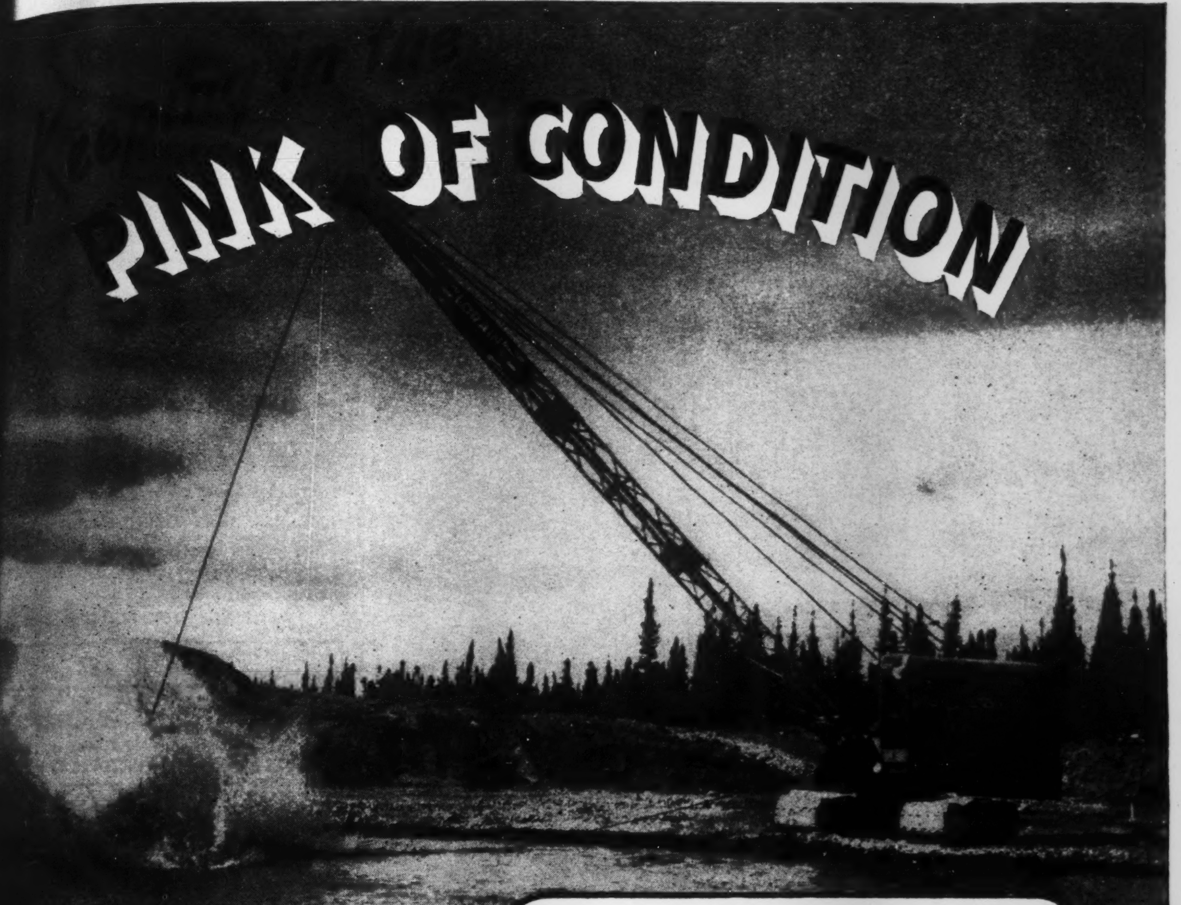
Especially adapted to War and cargo ships, a new light-weight decking material is available. It can be used on metal, wood, concrete and many other types of surfaces where tests have shown exceptional serviceability. It is produced in a thick liquid and is applied by spraying or with a steel trowel. As it is self-levelling, repairs can be made with no appearance of patchwork. In addition, it is claimed to provide excellent non-slip coverings for floors of all types, an affords excellent protection of metal fron corrosion and wood from moisture. I dries sufficiently in two and a half t three hours, in open air and under normal weather conditions, to allow ligh traffic. For heavy traffic, about 8 hours drying time is needed. With artificia drying, this time element can be reduced to a few minutes.—*Goodyear Tire & Rubber Co., Akron, Ohio.*

Welder's Head Protector

Shipbuilders, structural steel, and construction workers engaged in welding operations are offered a new head protector helmet. It is cap shaped. Supporting brackests on either side of the crown, consisting of knob, arm and joint, make it possible to hinge the shield on the cap. Thus the shield may be thrown back to rest out of the way on the peak of the protective cap when not in use.—*The Strauss Co., 925 Liberty Ave., Pittsburgh, Pa.*

Rock Crushers

Rock crushers of several different sizes and capable of producing crushed aggregate ranging in size from ⅛ to 4 in. have been developed of improved design. Made of heavy steel plate throughout and welded into a single unit, one type o crusher is said to be stronger and more durable, with considerably less weight than the older style cast steel frame. The old fashioned straight jaw plate with corrugated faces have been replaced by smooth-faced curved jaw plates which enable finer crushing in greater capacity at a lower unit cost, is claimed by the manufacturer. Other refinements are said to include separate Pitman shaft bearings and a new design of swing jaw suspension that reduces friction, thus prolonging the life of parts and saving power. This particular model is built in eight sizes, starting with 8x12 in. and having a range of 4 tons per hour (T.P.H.) for ⅞ in. aggregate or 1 T.P.H. for 2 in.; to 30x42 in. (range 11



FIX-IT
PLEDGED
CONSTRUCTION EQUIPMENT CONSERVATION

. . . And How!

KEEPING 'EM on the job and in top-rate operating condition—that's the purpose of this new 24-page handbook for Lorain owners and operators. It tells you how to renovate worn parts so they can be re-used efficiently; how to substitute for critical materials when making emergency repairs; how to do more with what you've got.

Hundreds of operators have found that the Fix-It Handbook can save them time, trouble and money. If you haven't received a copy, clip and mail the coupon below.

THEW. LORAIN

CRANES · SHOVELS
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THE THEW SHOVEL CO., Lorain, Ohio

Please send me a copy of the Thew Fix-It Handbook. If you would also like to receive a colorful, 5" red, white and blue Conservation Emblem for shovel, crane, tractor, bulldozer or truck, check here_____.

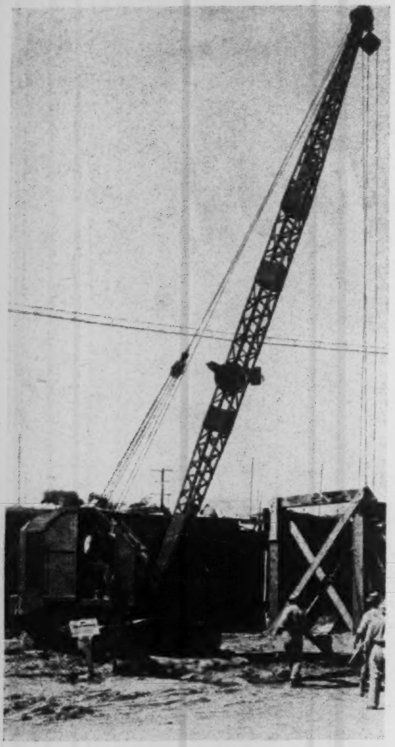
Signed __________

Lorain Model No. _____ Serial No. _____

Street Address __________

City _____ State _____

PLEDGED



Insley Helps

SPEED VICTORY

Speed is an essential element in today's plans for victory . . . speed on the battlefront . . . speed on the production-for-war front. When you remember that speed has for a quarter of a century been an outstanding feature of Insley excavators, it's easy, then, to understand why all Insley production is now earmarked for our armed forces . . . why Insley excavators are playing a vital role in helping to *speed the day of victory.* INSLEY MANUFACTURING CORPORATION, Indianapolis, Indiana.

INSLEY

T.P.H. for 2 in. to 275 T.P.H. for 6 in.).

Another type of crusher has two units built into a single frame, one superimposed over the other. The upper stage will receive the product of secondary crushers (range 3 in. feed opening for size 1 ft. 8 in. to 6 in. for size 4 ft.) and size it properly for introduction to the lower stage. The lower stage accomplishes the fine reduction ($\frac{1}{8}$ in.-$\frac{3}{8}$ in. for size 1 ft. 8 in., to $\frac{5}{16}$ in.-$\frac{3}{4}$ in. for size 4 ft.). Capacity of this machine varies from about 18 T.P.H. for the 1 ft. 8 in. size to 119 T.P.H. for the 4 ft. size. According to the manufacturer, this particular crusher has easy adjustment devices, shock absorber suspension, automatic forced feed lubrication, dust exclusion, roller bearing countershafts, cast steel frame and it is non-chokable at any setting.—*Traylor Engineering & Mfg. Co., Allentown, Penn.*

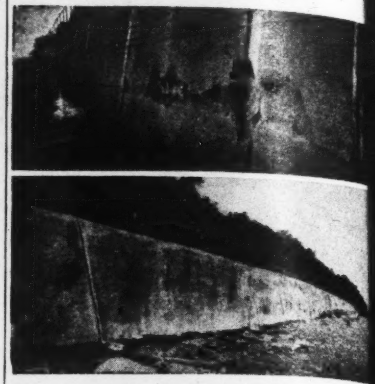
Bus-Drop Cable

A new loom bus-drop cable which carries power from bus bar to individual motor driven machines in war production plants is announced. The loom bus-drop cable can be used in new or conversion wiring or as a maintenance item. It can be hooked up easily and quickly in LVD or bus-duct systems. It is designed for long life under severe conditions such as vibration and rough usage, and it is neat in appearance. The cable consists of three stranded conductors, rubber insulated and braided, and a bare stranded ground wire. These conductors are cabled with saturated jute fillers and presaturated paper and tape. Over-all is a long wearing rugged loom weave with a finish that resists oil, grease, gasoline, moisture and is flame retarding. —*Wire & Cable Section, General Electric's Appliance and Merchandise Department, Bridgeport, Conn.*

Paper Cups Have Many Uses

The use of paper cups to save time and labor, and to speed up production is being continually expanded throughout many different fields of production and construction. Cups are light and easy to handle and nest when empty, taking up little space, The large range of sizes available readily adapts them to many particular and specific problems. One 16 oz. cup used for spraying paints, fits a standard spray gun and replaces metal paint-containers which require time, labor and solvent to clean after use. It is claimed by the manufacturer that real savings can be effected by using these cups and throwing them away after each use. Another contribution to the war effort is made by using one particular size of paper cup for a safety glue pot.

FOILING FATHER NEPTUNE



"Before and After" views of a concrete sea-wall near Port Washington, Long Island, N. Y., which had been badly damaged by the breakers, and was thoroughly reconditioned by the use of reinforced "GUNITE". This followed a similar job near the same location, done more than four years before and still in first class condition.

WRITE FOR OUR BULLETIN 2200

The "CEMENT GUN" can be bought by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

WE ARE ALSO "GUNITE" CONTRACTORS
LET US BID ON YOUR WORK

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WELLPOINT SYSTEMS

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Prompt Shipments

Send for our New 60 page illustrated catalog
"GRIFFIN POINTED WELLPOINT FACTS" chock full of latest information on Wellpoint Systems for dewatering, emergency and permanent water supply systems, also information on pressure pumps and data for jetting.

GRIFFIN WELLPOINT CORP.
881 EAST 141st ST. • NEW YORK, N. Y
Phones: MElrose 5-7704-5-6

omes in four colors—red, blue, green yellow, and is specifically designed the safe and economic use of casein urea-formaldehyde glues.—*Mono ice Co., Newark, New Jersey.*

Rolling Wood Grille

The manufacturers have just com- ted their experimental work on this product. The rolling wood grille s wood bars strung on light steel es operating up and down in wood ides. The design uses the minimum ount of critical material. The wood ling grille coils overhead on a hori- tal counterbalancing shaft, giving the e operation as a steel grille. No wall floor space is taken up, as the coil ntirely overhead and out of the way. e rolling wood grille makes a sub- ntial barrier and can be fabricated opening widths up to 19 ft. and ening heights unlimited. Operation is her push up, or for larger sizes, by nd chain or electric motor.—*Cornell on Works, Inc., 36th Ave. and 13th ., Long Island City, N. Y.*

Tire Conservation

With trucks and tires being used ound the clock every day in the week, es are wearing out much faster than normal times. Operators of this coun- y's 30,000 power industrial trucks can lp save war-precious rubber by fol- wing five simple tire conservation rules rked out by service engineers of the well-Parker Electric Co., Cleveland, These engineers have been collab- ating with rubber company research n to develop tires made of new com- unds, and have carefully analyzed the tual conditions under which the tires used. As a result, the company has mulated five rules for operators of its n and other makes of trucks to follow get more miles of wear from their es. These rules are as follows:

NO WONDER CONTRACTORS SWEAR BY

NAYLOR

LIGHT-WEIGHT PIPE

- It SAVES STEEL
- SAVES weight
- SPEEDS installation
- EASIER to handle
- LEAK-TIGHT, safer
- HOLDS true cylindrical form
- ABSORBS shock loads
- HANDLES jobs normally requiring heavier-wall pipe
- CUTS maintenance
- HIGH re-use value
- CONNECTIONS to fit your exact needs
- SAVES money

Contractors know from experience that it just doesn't add up to use heavy wall pipe when there's a light-weight pipe that can do the job. They have found that Naylor, with its exclusive Lockseam Spiralweld reinforcing truss, combines all the advantages of light weight with the strength, safety and stamina that tough jobs require. It will pay you in every way to get the complete story on Naylor Pipe.

NAYLOR PIPE SERVICE

Dredging . . Hydraulic Sluicing . . De-Watering . . Ventilating . . Exhaust and Intake . . Gas Gathering . . Pulp Lines . . Vacuum Lines . . and other high or low pressure lines

Sizes from 4" to 30" in diameter with all types of fittings, connections and fabrications.

Write for Naylor Catalog and Special Connections Bulletin.

Naylor

NAYLOR PIPE COMPANY

1248 East 92nd Street, Chicago, Illinois

BROTHER, THIS IS WAR!

Don't Let "Thin-Skinned" Tracing Cloths Slow Down Your Output!

"Thin-skinned" tracing cloths? They're the kind that won't take erasures without wearing through or smudging. How can draftsmen steer clear of them? By using Arkwright Tracing Cloths! Arkwight Tracing Cloths are "thick-skinned" – the base fabric is closely woven and the finish is extra tough. That's why Arkwright Cloths stand up to corrections and erasures so well . . . why they're preferred by so many warplant draftsmen. Arkwright Finishing Company, Providence, Rhode Island.

Arkwright TRACING CLOTHS

AMERICA'S STANDARD FOR OVER 20 YEARS

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★ DERRICKS

Complete Range
of Types and Sizes
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STERLING
LIGHT PLANTS

STERLING QUALITY

YOU'LL GET BETTER RESULTS WITH STERLING

WRITE FOR LITERATURE

Simple, Dependable, Rugged—the choice of contractors everywhere.

STERLING
MACHINERY CORP.
405 13 Southwest Blvd Kansas City, Mo

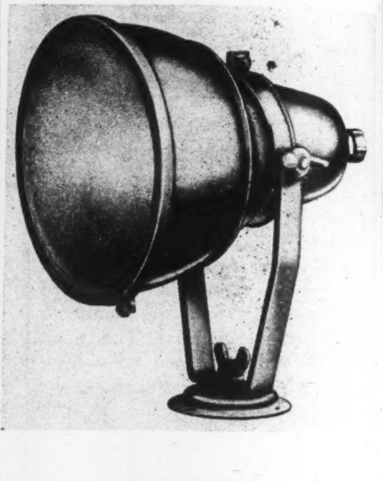
1. Avoid broken glass and sharp metal chips. Tires can be ruined in a few days by having pieces of rubber gouged out by sharp pieces of material.

2. Stay off the curb. Short cuts, in the long run, don't save time. Running tires over obstructions chews up rubber and tears the tires off the rims. It may also damage the truck.

3. Keep out of chock-holes. Avoid depressions and cracks in the floor or pavement. Jolts help destroy tires.

4. Keep out of oil. Oil and grease attack rubber. Tires should be cleaned periodically.

5. Start slowly. Rabbit-jump starts can tear miles from tires by grinding off the rubber.



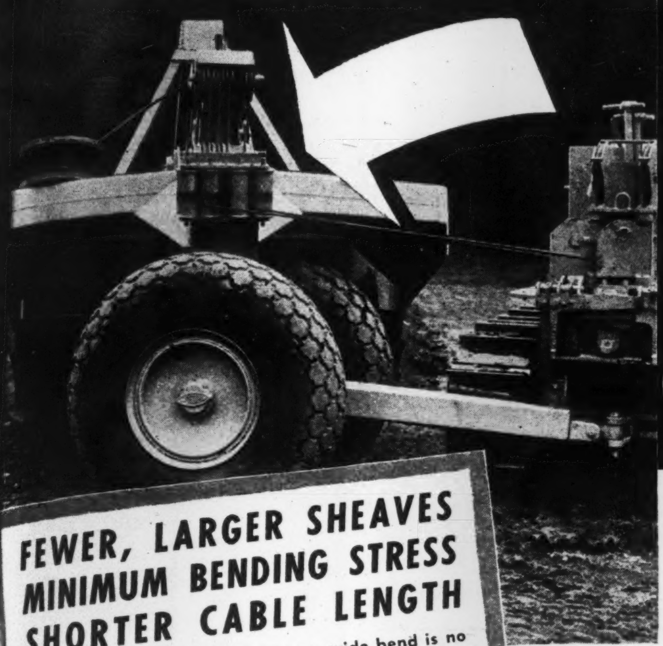
New Floodlight

Employing standard 200-watt incandescent lamp with silver mirrored glass for fixed locations or for mounting on power shovels, bulldozers, trucks and cranes, a new floodlight is offered by the Pittsburgh Reflector Co. The new floodlight is extremely shock-resistant and completely weatherproofed. It is housed in corrosion-resistant sheet steel housing with convex, heat-resisting 8⅝-in. cover glass, equipped with removable lens frame and clamp, porcelain socket and weatherproof cord-grip fittings. Floodlight is 12½ in. high overall; weighs 6½ lb. Adjustable bracket, permitting 250 deg. vertical and 360 deg. horizontal swing.—*Pittsburgh Reflector Co., Oliver Bldg., Pittsburgh, Pa.*

Non-Metallic Drain Pipe

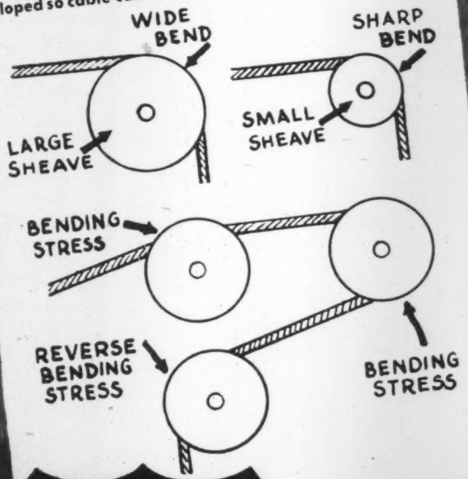
Development of a new line of nonmetallic drain and sewer pipe, requiring no critical war materials, to replace dwindling supplies of metal pipe, has been announced. Tests are said to have shown that pipe made of cellulose fibre

HERE'S WHY You Wear Out Less Cable With HEIL Cable Scoops



FEWER, LARGER SHEAVES MINIMUM BENDING STRESS SHORTER CABLE LENGTH

The only thing that is better than a wide bend is no bend at all. Heil leverage action greatly reduces the number of sheaves. Maximum stresses result from sharp bends and reverse bends. Heil uses large diameter sheaves and eliminates reverse bends. Cable grooves are smooth-surfaced, not rough cast. Flanges are sloped so cable can ride up if a small stone gets caught.



. . . and Save Money on Cable Replacements!

When Heil engineers developed the Heil Cable Scraper, they were not satisfied until they had achieved new simplicity in the use of cable. The Heil design therefore utilizes shorter lengths of cable and reduces to a minimum the continuous punishment of bending and unbending as it passes over and around the sheaves . . . Study the Heil Cable Scraper from any angle, and you find similar improvements to give you those heaping "bonus" loads faster and at lower cost — with steady, dependable service that gives *you* a reputation for dependability in finishing your jobs on time . . . Let us help you now to plan your post-war purchases of Heil dirt-moving equipment. Write for bulletins giving full details on Heil's advanced design.

R-10

★ ★ ★ ★ ★

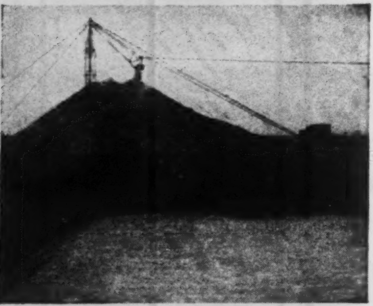
The HEIL Company is engaged in all-out war production for *Victory*

THE HEIL CO.

GENERAL OFFICES: MILWAUKEE, WISCONSIN

SAVE LABOR IN HANDLING MATERIALS

This Picture Shows a Small Sauerman Scraper Reclaiming Coal Mine Screenings from Waste Pile to Washing Plant.



Sauerman 2 cu. yd. Slackline Cableway digs a 40,000,000-gal. reservoir in 154 days, placing all the spoil in one long, high pile.

ANY SAVING in man-hours on construction work is a direct contribution to the war effort. Sauerman Power Drag Scrapers and Slackline Cableways are chosen for excavating and stockpiling on defense projects because this simple, sturdy equipment has a 30-year record as a saver of labor and power in moving all kinds of earth and bulk materials.

The first cost of a Sauerman machine for the average long haul job compares favorably with the cost of any other equipment that will dig, haul and place an equal yardage of materials. Moreover, a Sauerman machine is easy to operate and demands little by way of repairs, assuring a minimum daily expense.

Tell us about your problem and we will offer our advice on equipment, also send you our catalog.

SAUERMAN BROS., Inc.

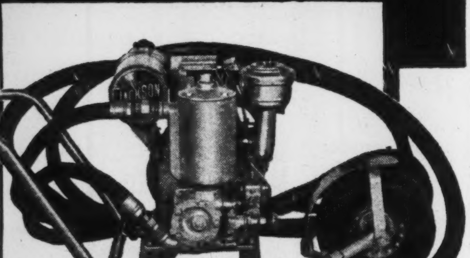
532 S. Clinton St. Chicago, Illinois

. . . If you want to make speed profitably . . . GET DEPENDABLE EQUIPMENT *. . Buy the Fast . . .*

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY

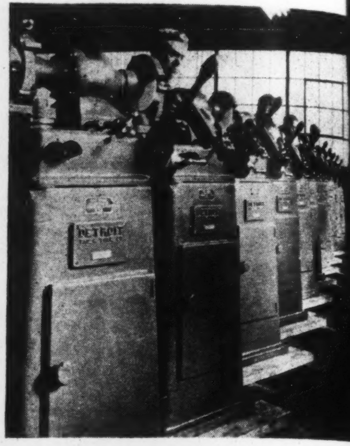
- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.



ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON, MICHIGAN

impregnated with coal tar pitch is only a satisfactory replacement but many cases an improvement over me pipe. It is claimed that this pipe is sistant to moisture, tuberculation, r growth, corrosion and most dilute in ganic acids and alkalies. It can be to desired lengths with an ordinary wo working saw. Couplings maintain pi lengths in line and provide tight joi if desired. The pipe is manufactured perforated and non-perforated form. T perforated pipe is designed especial for septic tank filter beds and found tion footing and field drainage.—*T Fibre Conduit Co., Orangeburg, N. Y.*



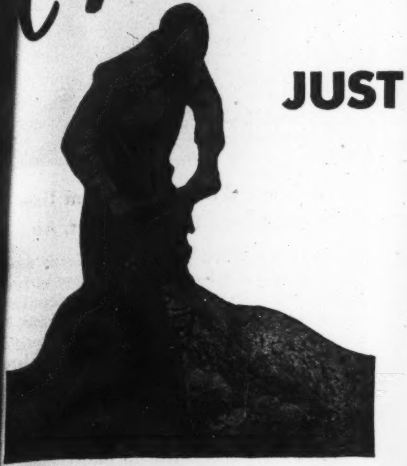
Tap Reconditioning Machines

In view of the large demand for tap reconditioning machines, these have been placed on a mass production basis by Detroit Tap & Tool Co. Each machine is estimated to save thousands of taps by enabling quick reconditioning of worn taps of virtually all sizes and types.—*Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.*

Manila Rope Substitute

Substitution of weldless chains for manila ropes of smaller sizes can be profitably employed by industrial and civilian users, so reports the Chain Institute, Inc., of Chicago. The army, navy and Maritime Commission's urgent need for manila rope was brought into sharp focus recently by an appeal from the WPB for all manila rope larger than ⅛ in. or longer than 200 ft. that can be spared. There is every likelihood that demand will continue to exceed supply, as the base material of manila rope, abaca fibre, comes chiefly from the Philippine Islands. The study made by the Chain Institute revealed that although capacity for the manufacture of welded chain is being taxed to the utmost to

CP Sinkers Can take it—



JUST GIVE THEM ORDINARY CARE

FEW hand-held drills are as well designed, as ruggedly built as CP Sinker Drills. You don't have to handle them with kid gloves or baby them on the job. But, you do have to give them reasonable care, and a few simple suggestions — like the four illustrated on this page — will help you to get maximum service from your CP-32, CP-42 and CP-10 Sinker Drills. Additional suggestions for the better maintenance of CP Sinker Drills will appear in future advertisements. Watch for them.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP SINKER DRILLS

1
Remove, clean air inlet screen every two weeks —more frequently if hose is old. Drill will lose power, if the air inlet screen becomes clogged.

2
Fill reservoir with good grade of oil of proper viscosity for weather conditions. If machine is used constantly, fill the reservoir every hour.

3
Before putting sinker drill in service, always connect the air hose and make sure oil is coming through the machine and out of the exhaust.

4
Blow air hose, connect to machine, turn on air and examine drill shank to see whether oil is going through working parts of the machine.

★★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N.Y.

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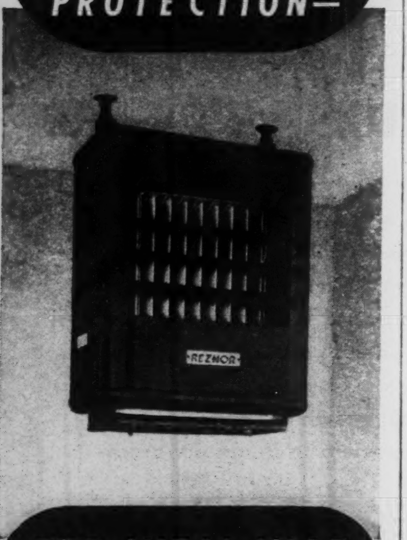
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

REZNOR
UNIT HEATER PROTECTION—



FOR VITAL WAR WORKERS EVERYWHERE

TODAY we must protect America's men and women who serve on the production lines. Therefore, these people need heat-comfort so they can work more efficiently with less time off for illness due to fatigue, colds, coughs, etc. Reznor Gas Fired Unit Heaters provide the answer to this problem. Furthermore, Reznor Equipment may be installed at far lower cost with fewer men, and in less time than other tyes of heaters. They move more warm air during winter and provide greater air circulation during summer—more war production results.

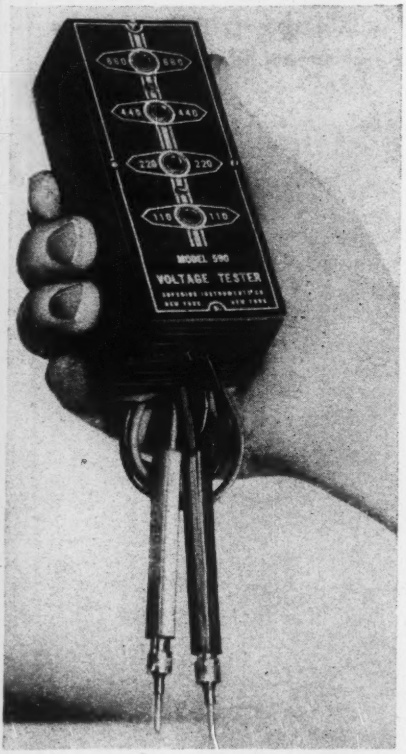
Write today for literature.

REZNOR MANUFACTURING CO.
105 James St. Mercer, Penna.

"GAS HEATERS EXCLUSIVELY SINCE 1888"

fill essential war demands, there does exist idle capacity for making weldless chain.

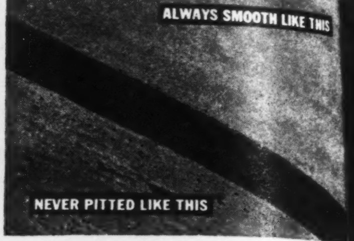
Breaking tests of weldless chains compared with manila rope were made by the Institute and a table was prepared showing the size of weldless chain required having comparable strength with each of ten different sizes of ropes under 1 inch in diameter. For instance, a 3/16 in. manila rope made to federal Specification TR-601a has a breaking test of 420 lb. and wartime substitute fibre rope a breaking test of 336 lb. Comparable weldless chains are Tenso Type No. 3 with breaking test of 375 lb.; Lock-Link Type No. 4 with a test of 405 lb., and Niagara Type No. 4 with a test of 420 lb. Similar comparisons have been worked out for rope sizes from ¼ in. to ¾ in. inclusive, and copies of the chart are now available from chain manufacturers and hardware wholesalers.



Voltage Tester

This device reads like a thermometer. To use it, one simply connects the needle pointed test prods across any electric line. It automatically indicates whether the voltage is 110, 220, 440 or 660 volts, if the current is a-c or d-c, if the appliance, motor, etc., connected in the line is "open"; which leg is "grounded"; if the frequency is 25 or 60 cycles; if the fuse is "blown"; when one side of an appliance or motor connected to the

How to get smoother harder surfaces . . .



Celotex Absorptive Form Liner Removes Excess Water, Air

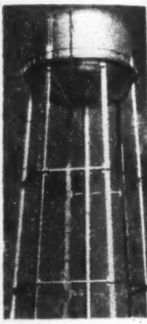
This unretouched photograph clearly shows the difference between concrete surfaces poured against Celotex Absorptive Form Liner and surfaces poured against other forms. By removing excess water and trapped air, this produces a smooth, dense, hard outer layer.

Better appearance, greater durability and resistance to abrasion are among the important results. Successfully used on many government projects, including dams, aqueducts, bridge piers, etc. Write for information.

CELOTEX

ROOFING • INSULATING BOARD
ROCK WOOL•GYPSUM WALLBOARD•LATH
PLASTER • ACOUSTICAL PRODUCTS

THE CELOTEX CORPORATION • CHICAGO



STEEL
TANKS
CANNOT
BE
REPLACED
NOW
•
PROTECT FILTERS
TANKS, CLARIFIERS
and Other Metal
FROM RUST
With

The **RUSTOP** (Cathodic) System. Completely protects all types of submerged steel from corrosion.

CLEANS OLD TANKS
KEEPS NEW TANKS CLEAN

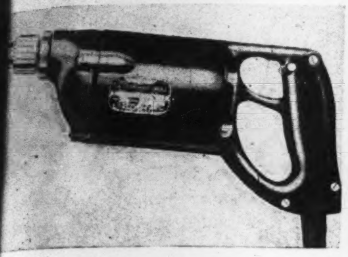
No Service Interruptions for Installation. Maintain Fire Protection Constantly.

THE APPROVED METHOD
MATERIALS AVAILABLE

RUSTOP
THE CATHODIC SYSTEM OF CORROSION PREVENTION

ELECTRO RUST-PROOFING CO.
DAYTON • OHIO

e under test is "grounded"; excessive kage between a motor and a line; or en a three-phase motor is running atically due to a "blown" fuse.—*perior Instruments Co., Dept. 5, 227 lton St., New York, N. Y.*



Improved Electric Tool

Using a new plastic material practical usings have been designed which of- r many advantages. The plastic is made th a shredded cotton duck base, which es it a high impact resistance, and ables it to withstand considerable abuse d wear. The plastic is also heat resist- t, and a perfect insulator against di- ectric shock. The housings are smooth d easy to handle, and the lustrous ack finish maintains the appearance the tool for a long period. For long oductive life, steel inserts have been aced into the plastic housings to carry l ball bearings and threaded steel in- rts in the field housing for housing sembly screws. Steel air vents in the mmutator end housing insure ample otor ventilation. In addition to these vantages, the use of plastic housings akes a definite contribution to the con- rvation of critical aluminum.—*Black Decker, Towson, Md.*

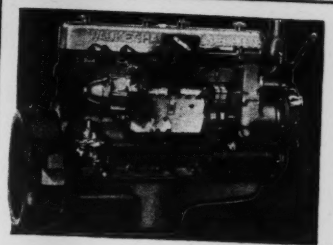
Asbestos-Protected Roofing

Made by carefully controlled processes, approved materials, this roofing is id to meet all standard government ecifications for asbestos-protected metal ofing and siding. The average antici- ated service, as exposed in industrial rroundings, is more than 20 years.—*elt-Cote Division, American Steel Band o., Pittsburgh, Pa.*

Carbide Grinder

This new machine provides for rapid emoval of metal when roughing, to- ether with the accurate finishing of all ngle-point tools to smooth, keen cut- ng edges with flat surfaces, held ex- ctly to the desired angles. Either silicon arbide or diamond wheels for grinding arbide, or aluminum oxide wheels for rinding stellite or high speed steel can e used. Among the features claimed r these grinders is the simple, positive,

IN NEW ZEALAND . . .
They get down to bed rock when selecting truck engines



★ The "men from down under" work their trucks hard. This one is helping to build an airdrome. It belongs to Messrs. Winstone, Limited of Auckland, New Zealand. They own several trucks. Some have Diesel engine power. Others, like this one, have Waukesha-Hesselman Oil Engines—*Model* 6-BKH, 3¾" x 4¼", 382 cu. in.

Diesels are a known quantity with Winstone's. After working Hesselman Oil Engines side by side with Diesels—they prefer Hesselmans —*decidedly!*

Starting with one Hesselman powered truck, Winstone's now have six. And they can tell you *why . . .*

Easier Starting because of Hesselman's low pressures and positively timed electric ignition. *Lower Upkeep . . .* the strain on rods, heads, pistons, cylinders and bearings is less. Hesselman explosion pressures actually are less than compression pressures in a Diesel. *Wider Range of Suitable Fuels*—high speed diesel fuels *and* Nos. 1, 2 or 3 furnace oils. *Greatest Overall Economy* because of these and other Hesselman features described in Bulletin 1175. Get one.

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

MORE POWER FOR VICTORY

WAUKESHA
Oil ENGINES

TAKE THE MACHINE TO THE JOB!

Let Us Plan EWC WHEELS and MOUNTINGS for Your Stationary Equipment!

Almost any type of machinery can be made more efficient if it is made portable—with the help of EWC Wheels, Axles, Springs, Tongues, etc. In these fast-moving days, when minutes count, equipment should be mobile to be most practical.

Write us for Illustrated Bulletins — and for sound engineering help based on more than 50 years of manufacturing experience.

EWC WHEELS

ELECTRIC WHEEL CO
Dept. NR, Quincy, Ill.

Typical Users of Electric Wheel Products

Gardner-Denver Co., Quincy, Ill. • Barber Greene Co., Aurora, Ill. • Ingersoll-Rand Co. • Geo. Haiss Mfg. Co., N. Y. C. • Chicago Pneumatic Tool Co., N. Y. C. • Pioneer Engineering Works • Schramm, Inc., West Chester, Pa. • T. L. Smith Co., Milwaukee, Wis. • LeRoi Company, Milwaukee, Wis. • Jaeger Machine Co., Columbus, Ohio

CONCRETE SHIPS are poured in Douglas Fir Plywood forms

● Above: The Maritime Commission's newest "war" ships are concrete oil and dry cargo barges.

● Left: Prefabricated forms of 5/8" Exterior-type Douglas Fir Plywood produce smooth, uniform surface on concrete, save form and finishing labor.

● Douglas Fir Plywood's versatility makes it one of today's busiest materials. Many of its unusual applications are illustrated in new War Use Folder. Write for a free copy. See how this Miracle Wood may be able to serve you after Victory. Douglas Fir Plywood Association, Tacoma, Washington.

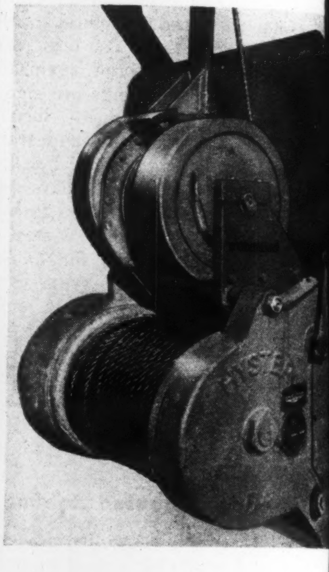
DOUGLAS FIR PLYWOOD
Real Lumber
MADE LARGER, LIGHTER
SPLIT-PROOF
STRONGER

STRONGER PER POUND THAN STEEL

quick-acting indexing device perm instant setting of the table to the d angle and eliminating all unnece loss of time and motion. Any d combination of diamond, silicon ca or aluminum oxide wheels can be to suit individual needs, and to p roughing or finishing to any desir gree of finish, of carbide, high steel, or stellite tools.—*Thomas P & Son, 120 Wall St., New York, N.*

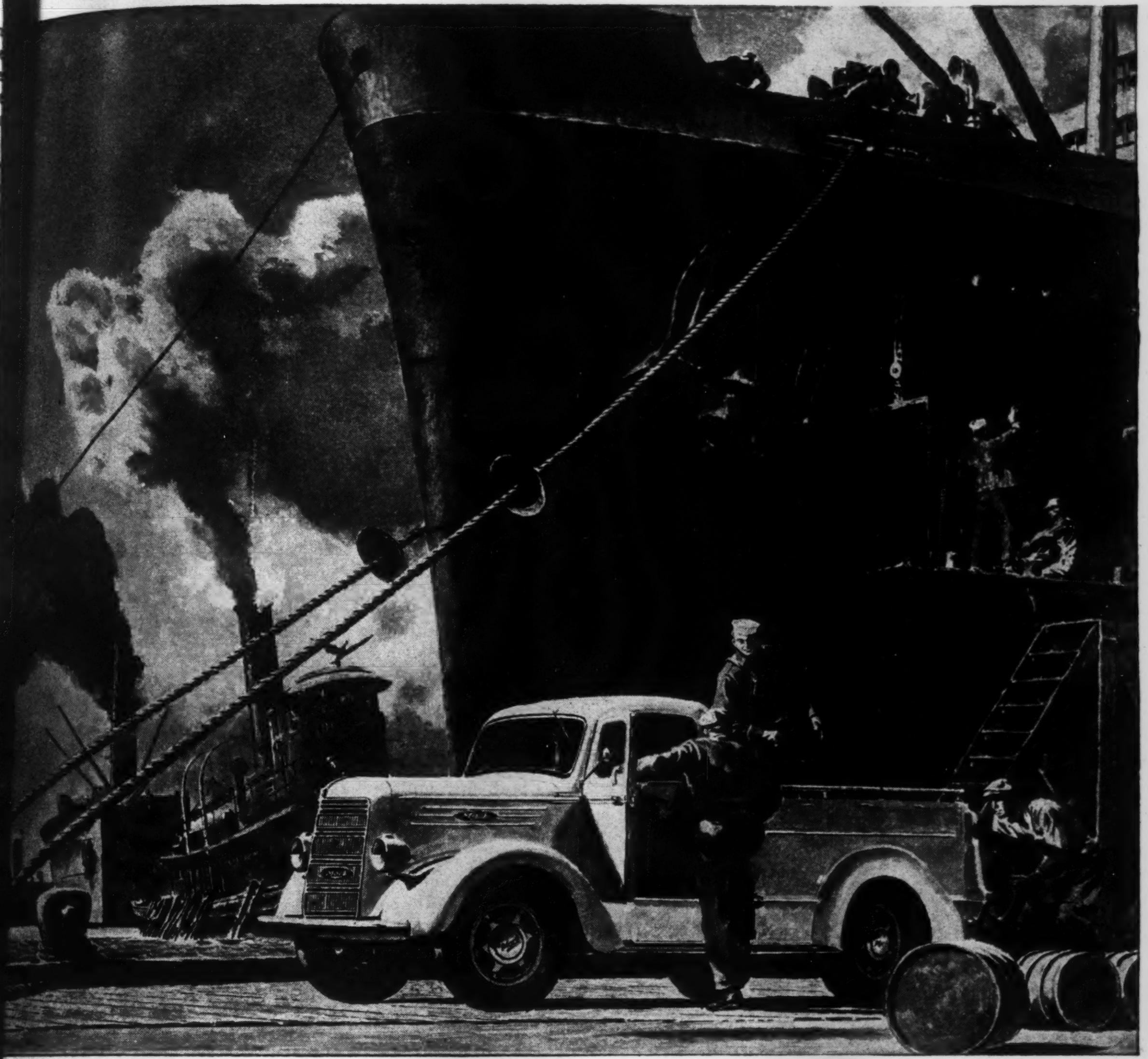
Anti-Rust Compounds

These compounds are formulate meet government, as well as indu specifications and requirements. T are four groups: fluid non-drying, g type non-drying, drying hard film, semi-drying waxy film. For further nical information, address—*The Si Co., Industrial Division, 2100 In Ave., Chicago, Ill.*



Double-Duty Power Control Unit

A compact power control unit has b developed by combining a single-dr PCU with a towing winch, making possible to install a bulldozer and tow winch on the same piece of equipm Both the winch and power control are standard, job-proved models and be operated independently or toget The drum has a speed of 308 ft. per m ute on bare drum, and the winch ha line pull of 15,400 lb. with a line sp of 91 ft. per min. on the bare dr While this unit was built primarily use by the Combat Engineers, it obvious advantages for loggers, cont tors, utilities and other tractor users need a bulldozer plus a power winc *R. G. LeTourneau, Inc., Peoria, Ill.*



Of every 10 Mack trucks built ten years ago—7 are still doing duty! Here Peter Helck sketches a "baby Mack" at dock-side.

ITS MIDDLE NAME IS . . . WORK!

Today's Mack trucks range in size from tough little one-tonners o the biggest Prime Mover in Uncle Sam's Army. But big or ittle—if its last name is Mack, its middle name is *work!* or 43 years, the world has watched the way Mack trucks vade into the toughest jobs in trucking. That is why the phrase "Built like a Mack truck" is a part of our language.

Mack Trucks, Inc., Long Island City, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

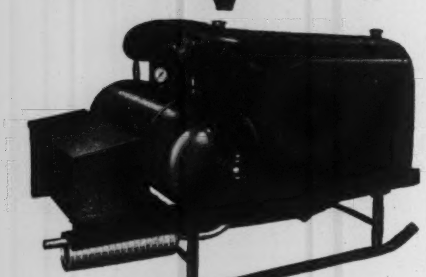
IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

Power

and plenty of it!

With the new, Victory Model
60 cu. ft.

SMITH AIR
COMPRESSOR



uses only
1 gallon
of gasoline an hour

SAVE 3-WAYS

SAVE TIME: The Smith is lightweight, flexible, — easy to move from one job to another. SAVE MONEY: -- on original purchase price -- on operating costs. SAVE GASOLINE — more important then ever before.

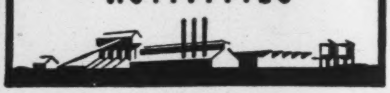
60 cu. ft. size (illustrated above) uses less critical material than any other standard compressor. Made with FORD MOTORS and standard parts. Repairs and parts available at any Ford garage. Automatic unloading and idling; self-starter. Wire, phone or write TODAY for complete information.

With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

Write for free Booklet

GORDON SMITH & CO.
INCORPORATED
430 College St. Bowling Green, Ky.

MANUFACTURERS' ACTIVITIES



To Emphasize the meaning of the slogan "'V' Depends on Me!" Leeds & Northrup Co., Philadelphia manufacturers of electrical measuring instruments and heat-treating furnaces, displayed mirror posters on the bulletin boards of its plant. Standing before the red, white and blue poster, one employee after another saw his or her face in the mirror above the slogan "'V' Depends on Me!"

The Buckeye Traction Ditcher Co., Findlay, O., announces the appointment of Paul B. Cochran as general manager of the company and his election to the board of directors. Mr. Cochran, who is well known throughout the construction industry, has been sales manager of Buckeye for the past several years.

As a patriotic move in connection with the national "Victory Garden" program, the Ilgair golf course built for employees of the Ilg Electric Ventilating Co., Chicago, Ill., is now being plowed up and divided into garden plots for Ilg workers. After taking a vote of plant employees, it was decided to sacrifice the golf course for the duration. More than 10 percent of the Ilg employees have already signed up for the new Victory Garden plots which will be assigned as soon as the fairways can be fertilized and plowed up at company expense. The golf course sprinkling system will be left intact for garden watering purposes. In addition to the 20x20 ft. plots for individual employees, the company will operate a victory garden for its own lunchroom where 600 persons are fed in day and night shifts.

Charles Belknap, chairman of the executive committee and executive vice president of Monsanto Chemical Co., was elected president of the company on March 23 to succeed Edgar Monsanto Queeny, who at the same time was elected chairman of the board, a position left vacant since the death in 1933 of Queeny's father, John Francis Queeny, the founder and first president of the company. In addition to being president, Mr. Belknap will continue as chairman of the executive committee. Mr. Belknap has been with the firm since 1929 when the Merrimac Chemical Co., of Boston, Mass., of which he was president, was bought by Monsanto. During the first

For the DURATIO

our boat - building facilities are 100% government.

★ ★ ★

Our foundation and dredging facilities are still available for commercial use.

BULKHEADS
PILEDRIVING
WHARF
CONSTRUCTIO

DELAWARE BAY
SHIPBUILDING CO., INC.
LEESBURG, NEW JERSEY

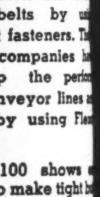
KEEP YOU
CONVEYO
BELTS GOIN

FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

● Avoid shutdowns a lengthen the life of y conveyor belts and buc elevator belts by u Flexco belt fasteners. Th sands of companies h stepped up the perfo ance of conveyor lines a cut costs by using Fle methods.

Bulletin F-100 shows actly how to make tight b joints in conveyor be with Flexco. Also illustrates step by step the latest practice in repairing rips and putting in patches.



Write
your

FLEXIBLE STEEL LACING CO.
4656 Lexington St., Chicago

FLEXCO HD BELT FASTENE

Sold by supply houses everywhere

orld War Mr. Belknap was naval transrtation chief following his graduation m the naval academy. After resigning om the navy, he became president of General Steamship Corp. and in 1921 e president of Merrimac Chemical Co., ston, and in 1928 its president.

rst medal award for the best use dur- 1942 of advertising as a social force been made to the current AMERICAN OCOMOTIVE COMPANY's advertising camign which began last November. The ard was given to Kenyon & Eckhardt, c., who prepared the advertisements r the American Locomotive Co. The ard was made at the eighth annual adrtising awards dinner held recently in ew York.

OBERT H. MORSE, JR., has been apointed general sales manager of Fairanks, Morse & Co. Mr. Morse comes his new duties ith a long and aried experience in he service of the ompany and with ts subsidiaries beinning in 1916. This experience inludes ten years in he manufacturing divisions which was followed by extenive sales experience as manager successively of the Cincinnati, Dallas, and Boston branches, and f the stoker division; and more recently s assistant sales manager. Mr. Morse saw considerable service in the regular army n 1917 in France and his oldest son, R. H. Morse, III, is now serving as an ensign in the United States Navy Reserve.

B. H. QUACKENBUSH has been appointed assistant sales manager of the Foote Bros. Gear & Machine Corp., Chicago, Ill. Mr. Quackenbush is a graduate of Mechanical Engineering College of the University of Illinois. He joined the Foote Bros. organization in 1933, and in 1936 he was placed in charge of the contract division, handling large machinery contracts. In his new position he will continue to handle contract sales, and in addition, will supervise the activities of the Priority Department and the activities of the Sales Department under the office of Price Administration on price regulations.

APPOINTMENT of A. N. Morton as production manager of the Mack Co.'s three huge plants has been announced by Charles T. Ruhf, president of Mack Mfg. Corp., and executive vice-president of the parent company, Mack Trucks, Inc. Mr. Morton, formerly factory manager

THIS DREDGE PIPE simplifies Wartime Problems

You'll find ARMCO Spiral Welded Shore and Pontoon Pipe a remedy for many wartime dredging headaches. Here's what it will do for you:

This special dredge pipe carries more yardage because it lasts longer and requires fewer time-outs for repairs and replacements. It speeds the work too. ARMCO Shore Pipe has accurate, machine-contracted joints that are easily assembled and practically leakproof. No bothersome shingling is required. A line may be "broken out" and reassembled in short order. All ARMCO Dredge Pipe is smooth inside — free from laps, weld globules and other obstructions. You can be sure of a steady flow, and pressures remain normal.

Take your wartime dredging operations in stride by equipping with ARMCO Spiral Welded Shore and Pontoon Pipe. Order it in any length that can be shipped and handled, and in diameters from 6 to 36 inches. Special elbows and bends are mill-fabricated to your specification. The standard dimensions and tolerances enable ARMCO Pipe to fit perfectly into any type of existing installation. Write for prices and delivery data. The American Rolling Mill Co., Pipe Sales Div., 901 Curtis St., Middletown, O.

ARMCO

SPIRAL WELDED DREDGE PIPE

Give your workmen this FIRM FOOTING

Kerlow open steel flooring offers real protection against industrial accidents. This strong, economical, wear-resistant grating permits light, air and heat to pass, yet is slip-proof in all directions. It doesn't collect grease, rubbish or dirt. Sections are tailored to fit, and easily installed.

FREE BULLETIN Write for your copy today

KERLOW STEEL FLOORING CO.
23 Mallory Ave. Jersey City, N. J.

KERLOW open STEEL FLOORING

Make Every Pay Day a Bond Day — Buy U. S. War Bonds and Stamps

KERLOW RETICULATED DESIGN ...A PATTERN FOR VICTORY

Another HAYS Product

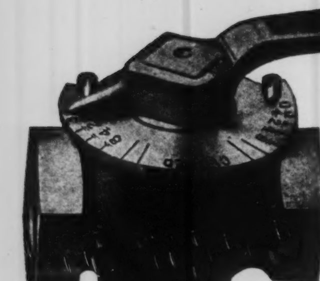


Fig. 293-B—Diamond opening in plug.

Fig. 293-C — Full straight-way opening in plug.

Sizes 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3".

DIAL INDICATOR STOP

Many new uses for this Hays product have come to our attention recently. First designed and built for gas service it has been widely used to control the flow of liquids and gases. Made of Steam Metal—tested at 200 lbs. pressure. Have you a vital war application for it?

HAYS MANUFACTURING CO., ERIE, PA. • SINCE 1869
HAYS Piping Products
FOR LIQUIDS, STEAM AND GASES

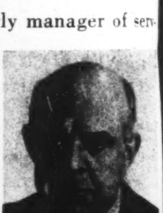
of the Plainfield, N. J., plant, in h capacity of production manager will e tend his duties to the New Brunswic N. J., and Allentown, Pa., plants as we In his new position, Mr. Morton follo Mr. Ruhf, who had been operating vi president in charge of the factories b fore assuming the presidency.

Among The Companies which ha recently received the Army-Navy "E award are the Cummins Engine Co., Columbus, Ind.; the B. F. Goodrich C at its Koroseal plant in Niagara Fall N. Y.; and the plant of the Masoni Corp. at Laurel, Miss. In the latter pla the ceremony climaxed a day-long cel bration on Feb. 25. Presentation of th "E" pennant was made by Rear Admira William C. Watts, United States Na (retired).

The Wiremold Co., Hartford, Conn has appointed J. E. Love as their ne district manager to succeed H. C. Mora recently retired.

The Many Friends of A. H. We mann, who recently resigned as manage of the Worthington Pump & Machiner Corp.'s El Paso, Texas, district offic will be interested to learn that he is no connected in an important capacity wit the Barber S.S. Lines, Inc., Brookly N. Y.

The Westinghouse Air Brake Co., Pitts burgh, plans to market remote pneumati control systems providing accurate, flex ible controls for industries. This is unde Westinghouse Air Brake's broadened in dustrial program, according to an an nouncement by George A. Blackmore.



Ben F. Lease, formerly manager of serv ice and research, has been made domestic sales manager of the Athey Truss Wheel Co., Chicago, Ill. Well known throughout the construction equipment industry, Mr. Lease started with Athey in 1931 as district representative. In a short time he was made special representative and then was given the duty of directing service and research.

R. P. Pennoyer, who formerly was in charge of piling sales in the sales engi neering department of the **Carnegie-Illi nois Steel Co.**, has been called into active service as a colonel in the U.S. Army.

SINCE 1916–

22 Foundations for One Client–

and not one pound of steel *wasted* in the ground!

Because this client is one of America's foremost companies . . . now all out for Victory . . . neither name nor location can be featured.

The first contract was awarded to us in 1916. To date . . . 21 additional jobs have been completed for this company, *each* for our Standard *Uncased* Compressed Concrete Piles, which *do not* require permanent steel casings left in the ground.

We drive *cased* piles of course, and *wood*, and *precast*, and *pipe*, and do not hesitate to recommend them when necessary. But today . . . more than ever . . . when both metal *and* wood are critical materials . . . MacArthur *Uncased* Compressed Concrete Piles are logically preferred.

Saving *vital* metal is nothing new to MacArthur.

MacARTHUR

CONCRETE PILE CORPORATION, 18 East 48th Street, New York City

Established 1910

BOSTON: 6 Beacon Street • NEW ORLEANS: 823 Perdido Street

CINCINNATI: 1542 Shenandoah Avenue • CLEVELAND: Swetland Building • PITTSBURGH: 530 William Penn Pl.

IMPACT AND POUNDING

at Irvington
and Liquid Carbonic

At Irvington Varnish and Insulator Company, Irvington, N. J., **Cortland EMERY Aggregate** flooring withstands the impact of an all-day, all-night pounding of a parade of kettles weighing at least a ton-and-a-half each as they are hauled to and from the varnish baking ovens. In addition, Irvington states: "We have also found **Cortland EMERY Aggregate** resistant to corrosive acids - - a valuable help in our processing."

At the Liquid Carbonic Corp., Cambridge, Mass., **Cortland EMERY Aggregate** flooring again withstands the impact, pounding and weight of heavy steel gas cylinders on a loading platform where service is severe and constant.

Cortland EMERY Aggregate has been installed at these two plants because it does not break down under great weight and continual wear - - because its heavy duty, non-slip (even when wet), and wearproof qualities continue clear through to the concrete base and are not merely on the surface.

Hundreds of other leading plants have also installed **Cortland EMERY Aggregate** flooring. It is merely a selected Emery aggregate which is mixed with cement and water only - - three natural products easy to lay by anyone who can handle concrete. It is outstanding for new floors, for laying over old floors, for resurfacing aisles and runways, and for repairing and patching cracked and broken floors. Because **Cortland EMERY Aggregate** is a mined product, there is no delay in delivery - - so write at once for complete information and prices.

WALTER MAGUIRE COMPANY, INC.
330 West 42nd St. New York, N. Y.
Distributors in principal cities

Leading architects and engineers are specifying Cortland EMERY Aggregate for new flooring, resurfaced floors and repairing worn floors. We will gladly send special material to architects and engineers for their files.

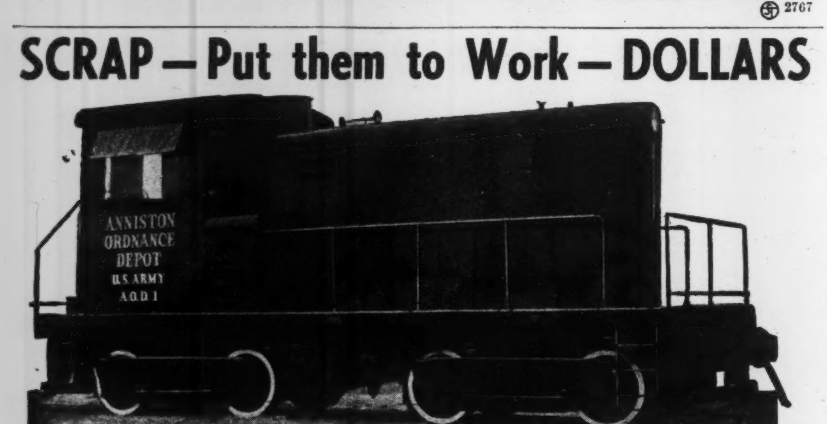
●

Certain territory is still open and Cortland EMERY Aggregate offers unusual opportunities to agents, distributors and dealers who now need new fast-selling items. Write for complete information.

Cortland
EMERY
Aggregate
for heavy duty non-slip floor topping

2767

SCRAP—Put them to Work—DOLLARS



The price of VICTORY is a steady pressure of man-power, armaments and dollars. Without a constant flow of SCRAP the stream of guns, tanks, trucks, ships, shells and planes cannot be kept at VICTORY levels. Without stupendous armies of Victory Bond and War Savings Bond DOLLARS—your dollars among them—Uncle Sam will be hard put to finance the biggest task he has ever assumed. On your toes for heavier blows—against the axis.

DAVENPORT
LOCOMOTIVES

STEAM-GASOLINE-DIESEL
LOCOMOTIVES
ELECTRIC OR
MECHANICAL DRIVE

EXPORT FORCES BROWN & SITES 50 Church St., N. Y. Cable Add. "Brosites"

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

NEW
TRADE PUBLICATIONS

Fire Brigade Manual—This 184-pag volume, recently published by the National Fire Protection Association, i designed as a training manual for employees assigned to carry out fire fighting duties under direction of the chie of the private brigade. It also can b used as a reference book where a fir brigade is already organized, but wher the experience of a large group of experts can be profitably utilized. Th book is divided into 16 chapters wit the following titles: The industrial fire brigade, forcible entry practices, rope work, fire extinguisher practices, ladder practices, hose practices, salvage and overhaul practices, fire streams, ventilation practices, periodic inspections of plant fire protection equipment, care of fire brigade equipment, fire causes and fire hazards, fire fighting procedure, flammable liquid and gas fires and special extinguishing systems, electrical gas masks and rescue practices. Single copies $1.50 postpaid.—*National Fire Protection Association, 60 Batterymarch St., Boston, Mass.*

Construction Equipment—Chicago Pneumatic Tool Co. has issued a handsome 64-page catalog of its full line of construction equipment. This is a quick, convenient reference book covering the company's equipment available for practically every type of time saving and labor saving operation. The different product sections include compressors, diesel engines, rock drills, wagon drills, pneumatic tools, and electric tools.—*Chicago Pneumatic Tool Co., Chicago Pneumatic Bldg., New York, N. Y.*

Reconditioning Pump Shafts—"New Parts from Old" is the title of a booklet issued to describe how to recondition worn pump shafts and rods. It shows how strategic materials can be saved by reconditioning this equipment for further service. The various processes to obtain the results indicated are considered under the following headings: machining and refinishing; building up the worn section to its original size, by metal spraying and by electroplating.

PRODUCTION MEN:

Here's Some Straight Talk About You!

his message comes from men in *your* eld—men who speak *your* language uently.

The President of the Pacific Steel Casting Company, Mr. Ivan L. Johnson, says:

> *"... if any measure of success has come to me, the Alexander Hamilton Institute played no small part in bringing that about."*

Similar endorsements from industrialists ll over the country show beyond question that the Institute is doing an outstanding job in equipping technical men —engineers, chemists, metallurgists and others—to assume the responsibilities required of top executives.

Sprague Product's Managing Engineer, Mr. Leon Podolsky, phrases it this way:

> *"... men who are primarily engineers, like myself, have tended to become narrow specialists. To date, the Course has given me a very fine insight and understanding of general business organization."*

Men employed on the production side of business are becoming increasingly conscious of the necessity of a thorough training in business fundamentals—not just production, but in marketing, accounting and finance as well. A working knowledge of *all four* divisions is essential for those who aspire to "top bracket" positions.

Some Industrial Subscribers

Among the Institute's subscribers (total exceeds 400,000) are such prominent men as:

- J. W. Assel, Chief Engineer
  Timken Steel & Tube Co.
- Lewis H. Bates, Plant Manager
  E. I. Du Pont de Nemours & Co.
- Frank C. Dana, Personnel Director
  Four Wheel Drive Auto Co.
- Benjamin F. Fairless, President
  U. S. Steel Corporation
- Lewis P. Kalb, V. P. Chg. Eng. & Mfg.
  Continental Motors Corp.
- A. N. Kemp, President
  American Airlines, Inc.
- Murray S. Kice, Chief Engineer
  American Blower Corp.
- H. W. Steinkraus, President
  Bridgeport Brass Co.

There is a scientific quality about the Institute's training which appeals to these men. It is basic, broad in scope and fits neatly into a busy schedule. It further provides access to the thinking and experience of the nation's famed industrialists.

These Men Contribute

Among the many industrial leaders who contribute to the Course are:

> Frederick W. Pickard, Vice President and Director, E. I. Du Pont de Nemours & Co.; Alfred P. Sloan, President, General Motors Corporation; Clifton Slusser, Vice President, Goodyear Tire & Rubber Co. and Thomas J. Watson, President, International Business Machines Corporation.

SEND FOR THESE TWO BOOKS

Forging Ahead in Business
2

"Forging Ahead In Business" is a 64-page booklet which represents the experience of 31 years in training men for success. Today's timely edition, written in the light of recent world-wide developments, can be of immense value to you. There are no copies for boys or the merely curious; but to any man of serious purpose, it is sent *free* and without obligation.

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Position...
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One Man
Does the Work
of Five
—and Gets Better,
Stronger Concrete
Mall
TRADE MARK

"THROW YOUR SCRAP INTO THE FIGHT"

3 H. P. ELECTRIC
VIBRATOR

● Here's the one-man MALL Electric Geared Head Vibrator that is saving man hours, time and materials on War Construction jobs.

This big capacity unit is recommended for placing large masses of low-water-cement-ratio concrete for dams, locks, piers and other heavy construction. Operates 2⅜" diameter concrete vibrating element. It is easily carried by one man anywhere on the job and provides super-power for every application. Other gasoline-powered, electric and pneumatic units 1½ H.P. to 3 H.P. are available for War Construction.

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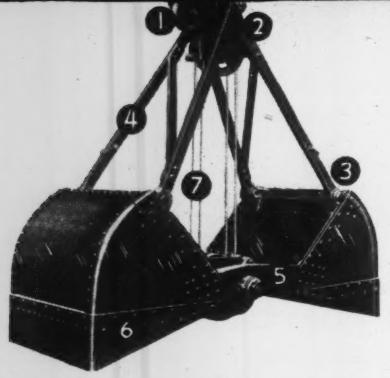
Offices and Distributors in Principal Cities

SEVEN FACTS
IT WILL PAY YOU TO KNOW ABOUT BROWNHOIST BUCKETS



① 5 to 22% larger sheaves lengthen rope life.
② Underslung top block lowers center of gravity.
③ Extra large cover-bracket-bearings easily lubricated.
④ Well-braced, forged Bail Bars give extra strength.
⑤ Annealed cast steel closing arms increase digging efficiency.
⑥ Heavy carbon-steel sharpened digging lips (with or without teeth) provide efficient digging.
⑦ Cables last longer by being kept from contact with material.

Write today for complete catalog of Brownhoist rope reeve, power wheel, special purpose, open type grab, link-type buckets.

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Among the suggestions for operati pumps to prolong the life of rods a shafts are the following: Use a goo quality of packing recommended by manufacturer for the particular type service; before putting in new packin make sure that every particle of the ol packing is cleaned out; tighten up th packing gland evenly; back off the nu two or three turns and adjust them finge tight; make sure that the gland follower do not ride on the piston rods or im peller shaft; to prevent burning of th packing and scoring of the shaft o sleeves in a centrifugal pump, a smal amount of water should always seep ou through the stuffing box while the pum is running; two ways to make packin last longer in centrifugal pumps are to use a light grease on the new packing and to cool the stuffing box externally until the packing is run in and some sealing water leaks through the box; when packing becomes hard and dry, do not attempt to stop excessive leakage by tightening up further on the gland. Replace packing immediately.—*The International Nickel Co., Inc., 67 Wall St., New York, N. Y.*

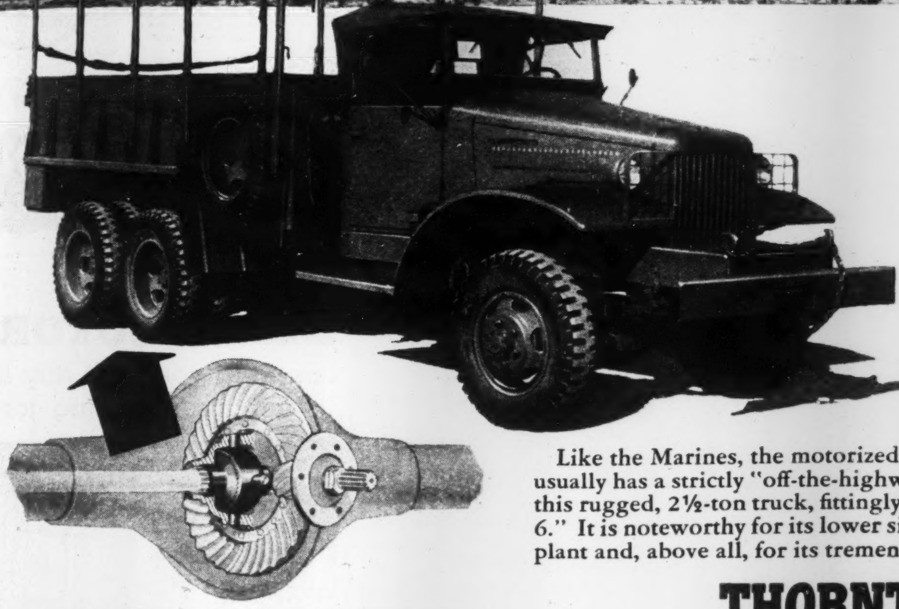
Metal Band Saw—Speed, accuracy and efficiency are claimed for the Johnson metal cut-off band saw described in a four-page folder. There are listed 19 outstanding advantages of this product—*Johnson Mfg. Corp., Albion, Mich.*

Plastic Parts—A folder has been issued which uses photographs to illustrate nearly a score of important plastic parts recently produced for essential war use. The circular emphasizes the fact that all plastic fabrication is done without molds, and to closest tolerance specifications—*Creative Plastics Corp., Technical Sales Dept., Kent Ave. Nr. De Kalb Ave., Brooklyn, N. Y.*

Colloidal Graphite—A 14-page illustrated booklet, No. 422-GG, on the use of "dag" colloidal graphite as a parting compound has been released by the Acheson Colloids Corp., for screw threads, and many other applications—*Acheson Colloids Corp., Port Huron, Mich.*

Blow Torch Methods—To be of help to the users of blow torches and other gasoline appliances, the Turner Brass Works is publishing "Turner Topics" in which operating and maintenance instructions are given in action pictures. To date three issues are available, as follows: (1) How to light your blow torch; (2) how to clean your blow torch, and (3) how to solder. "Turner Topics" will be sent free of charge on request.—*Turner Brass Works, Sycamore, Ill.*

THE MARINES HAVE LANDED!



Perfectly trained . . wonderfully equipped . . ready for tropic mud or arctic snow . . prepared to tackle man or nature. That's the Marines!

Like the Marines, the motorized equipment used by them usually has a strictly "off-the-highway" job. A typical unit is this rugged, 2½-ton truck, fittingly named the "Marine 6 by 6." It is noteworthy for its lower silhouette, its husky power plant and, above all, for its tremendous tractive ability.

The THORNTON Automatic—Locking DIFFERENTIAL provides full driving torque to either wheel *even though one wheel is on ice, snow or mud.*

Thus there is no wheel-spin . . . instead there's positive traction even under conditions where trucks with ordinary differentials would be stuck.

THORNTON
Automatic-Locking
DIFFERENTIAL

in both rear driving axles eliminates wheel-spin and gives positive traction in mud, sand, snow or ice.

These THORNTON qualities that serve the Marines so well . . . sturdiness, tractive ability, dependability . . . fit equally well into other military vehicles.

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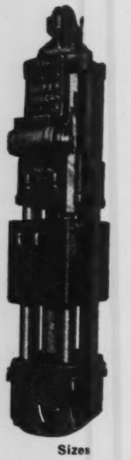
Manufacturers also of the THORNTON Four-rear-wheel DRIVE for trucks
"When you need TRACTION you need THORNTON"

MORE PENETRATION *per* MINUTE

SUPER-VULCAN
OPEN TYPE
Differential Acting
PILE HAMMERS
18C-30C-50C and 80C

● As the piles go down get them there in quickest time with least effort and with savings in cost. Twice the blows per minute does the job. Each blow takes but one quarter to one third the steam. Things to consider are the rugged strength, positive action, and compactness. The open type fits the same leads and uses the same accessories as the VULCAN single-acting Pile Hammers.



Sizes
18C—30C—50C—80C
meet all needs

WRITE FOR BULLETINS

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago Illinois

MEN AND JOBS

George E. Symons, chief chemist of the Buffalo Sewer Authority, has resigned to become associate editor of Water Works & Sewerage Magazine. Dr. Symons was also secretary of the Buffalo Section of the American Society of Civil Engineers.

Sidney L. Stolte, Minnesota state WPA administrator, has resigned to become associated with the firm of P. V. Bettenburg & Co., architects and engineers, St. Paul, Minn.

R. K. Williams, one of the best known contractors of Richmond, Va., has just become a major of engineers in the United States Army. He is to report at Camp Claiborne, La. Mr. Williams has done considerable highway and city paving work in Virginia.

M. G. Spangler, research associate professor of civil engineering, and **J. P. Lawlor**, assistant professor of sanitary engineering, both of Iowa State College, Ames, Ia., have accepted commissions as lieutenant commanders, Civil Engineer Corps, United States Naval Reserve, Construction Battalion, and are now taking training at Williamsburg, Va.

Lt. Col. Ira F. Bennett has been made district engineer, United States Engineer Office, Charleston, S. C., succeeding **Col. D. W. Griffiths** who has been transferred to Jacksonville, Fla., as district engineer.

Frank Woodbury Jones, partner in Havens & Emerson, consulting engineers, Cleveland and New York, has been appointed sanitarian in the Reserves, United States Public Health Service, and has been assigned to duties as regional sanitary engineer, Fifth Area, O.C.D.

Maj. E. E. Gialdini, Fort Bragg, N. C., a graduate of the University of California engineering college, who has been on active duty since Jan. 1, 1941, has been named commanding officer of the Des Moines, Ia., ordnance plant. He succeeds **Col. A. M. Wolff**, who has headed both the Des Moines and Milwaukee, Wis., plant and is now going to Milwaukee to head that plant alone.

Warner Harwood has been appointed regional highway engineer of the Portland Cement Association for the territory comprising the states of Wisconsin, Minnesota, North Dakota, Iowa, Nebraska, Missouri, Kansas, Arkansas and Oklahoma. Mr Harwood received his civil engineering degree from Cornell

Better Work—
FASTER

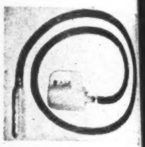
WITH VIBER VIBRATION

Viber Vibrators, proved on scores of big job are making history today on war construction because they *speed up concrete work*. New mode are completely interchangeable for gas, electri and air operation.

There is a Viber Vibrator specifically designed for every type of concrete construction.

● FLEXIBLE
ELECTRIC VIBRATOR

Made in 2⅛" and 3" diameter with 12 ft. and 21 ft. flexible shaft. Complete interchangeability — Flexible Casings, Cores, Vibrators. Universal type motor. Built-in protective "ground."



NEW CATALOG describes latest line of Viber Vibrators. Send for your copy today.

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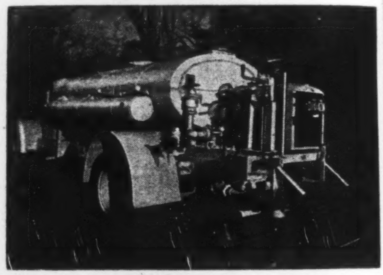
KINNEY DISTRIBUTORS

can help you with any bituminous surfacing job



They are designed for accurate application—for simplicity in operation and control—for the safety of the operators—and for many years of satisfactory operation.

To give this service the pump is located so it can be easily packed; working parts are "get-at-able" for proper lubrication; fuel tank is located well away from burners; and correct weight balance reduces wear on tires.

Write for Bulletin A—

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3527 Washington St. Boston, Mass.

approved Construction Materials

MANUFACTURED *by* SERVICISED

The products listed below are manufactured by SERVICISED and specified for general construction by leading Architects and Engineers throughout the country.

SERVICISED EXPANSION JOINTS

- Asphalt Expansion Joint
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Pioneers in the Expansion Joint Field for Over Twenty-three Years

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Asphalt Plank
Slate Surfaced Asphalt Plank
Asphalt Rail Filler
Asphalt Corrugated Eave Closure Strips
Rubber Cement
Asphalt Plank Protection Course
Rubber Tile Flooring
Rigid Sheathing Board
Mineral Surfaced Asphalt Plank
Rubber Corrugated Eave Closure Strips
Cork-Rubber Flooring

SEWER PIPE JOINTING MATERIALS

TUFFLEX (Cold Troweled Compound)
HOT POURED COMPOUND Premoulded Sewer Pipe Belts

SPECIAL INDUSTRIAL PRODUCTS

Sheet Rubber Gasket Materials
Cork Rubber Gasket Material
Oil Resisting Gasket Material
Asphalt Composition Cable Conduit
Sponge Rubber Sheets
Sponge Rubber
Molded Rubber
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Aircraft Flat Stock
Marine Flat Stock
Molded Plywood Components (to your specifications)
Matched-Veneer Panels
Special Cut-Out Plywood parts

Our continual research and experiments are producing commodities to meet the demands of the most exacting nature. The Engineers in our laboratory will assist you in any construction problem involving the type of products we manufacture.

We grant you this service and gladly invite your inquiry.

Sample And Specifications For Any of the Above Items Will Be Sent Upon Request.

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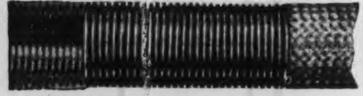
FLEXPEDITE

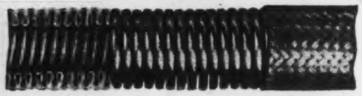
Your Conversion—Assembly—Production
with
REX-WELD
Flexible Metal Hose

Rex-Weld Hose—Annular Corrugations



RW-80 Unbraided ——— RW-81 Braided

Rex-Weld Hose—Helical Corrugations



RW-90 Unbraided ——— RW-91 Braided

—General Data—

	STEEL	BRONZE
Sizes	To 4" I.D.	To 4" I.D.
Pressures	To 14,500 p.s.i.	To 14,500 p.s.i.
Temperatures	To 1000° F.	To 450° F.
Lengths	To 50'	To 50'

—Use Chart—

	*STEEL	BRONZE
Saturated Steam		✓
Superheated Steam	✓	
Sulphur Bearing Oil	✓	
Oxygen		✓
Ammonia	✓	
Carbon Dioxide	✓	
Sulphur Bearing Grease	✓	
Critical Vibration		✓
Non-Sparking		✓

*Protective Coatings Can Be Applied for Corrosion Protection (To Conserve Critical Copper Bearing Alloys).

Couplings: REX-TITE Mechanical (Re-attachable) Couplings; Solder Couplings; Brazed and Welded Couplings and Flange Assemblies for Rex-Weld Flexible Metal Hose.

Ask for Engineering Recommendations

CHICAGO METAL HOSE CORPORATION
General Offices: MAYWOOD, ILLINOIS
Factories: Maywood and Elgin, Ill.

University. He has specialized in h
way and municipal work, both as a p
ticing engineer and as an enginee
public work with the Cook County h
way department in Illinois.

Robert F. Ruffner, of Raleigh, N.
U. S. Army regional engineer statio
at Camp Sutton, N. C., has been
moted from first lieutenant to capt
In his present capacity as regional
gineer he is in charge of new constr
tion at Camp Sutton, Camp Croft, S.
the army air base and municipal
port at Greenville, S. C., Morris Fi
N. C., and the Sand Hill, N. C. bomb
and gunnery range.

W. W. Rohrbough, effective April 1,
came division engineer for the New Y
Central System, with headquarters
Springfield, O., in place of **W. H. Mie**
who was transferred.

Lewis L. Baxter, who arrived in Pa
ama a year ago as senior civil engine
Caribbean Defense Command, and w
commissioned major, C. E. C., last Ju
has been promoted to lieutenant colon
He is at present in charge of the equi
ment section, construction district, Pa
ama Division. Formerly, for a numb
of years, a member of the architectur
and engineering firms of Morgan, Frenc
& Co., Inc., of New York City, Lt. Co
Baxter was more recently connected wi
the Atlanta Regional office of the Fe
eral Works Agency as head of the build
ing construction unit of the regiona
engineer's organization. His prese
permanent home address is Ponte Vedr
Beach, Fla.

Lt. Col. H. J. Woodbury, assistant engineer of the Northwest Service Division at Edmonton, Alta., has been assigned as district engineer at Milwaukee, Wis. He succeeds **Lt. Col. E. E. Kirkpatrick,** who has held the post since October and now goes to Edmonton.

Capt. Leonard L. Frederick is now stationed at Camp Butner, N. C., as commanding officer of the 480th Engineer Maintenance Company. A graduate of Oklahoma A. & M. College, Captain Frederick has seen duty at Fort Logan, Col., Fort Sam Houston, Tex., Fort Belvoir, Va., and Camp Gordon, Ga.

E. F. Sullivan, civil engineer for Public Works Division, Puget Sound Navy Yard, for over two years, has been transferred to the naval air station, Moffat Field, Sunnyvale, Calif., where he will be resident engineer. Mr. Sullivan was formerly city engineer of Rawlins, Wyo. and WPA engineer.

Save up to 50% OF LUMBER

by Specifying TIMBEAM

The New System of WOOD STRUCTURAL FRAMING

Made of STANDARD PLYWOOD and STANDARD DIMENSION LUMBER

WOOD PLATE GIRDERS
BEAMS
PURLINS
JOISTS
AND COLUMNS

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Does not require Stress Grade Lumber in its Fabrication

TIMBEAM fits squarely into today's picture where scarcity demands alternates for critical materials. Because of their design, TIMBEAMS often save more than one-half of the lumber required for solid sections of equivalent strength.

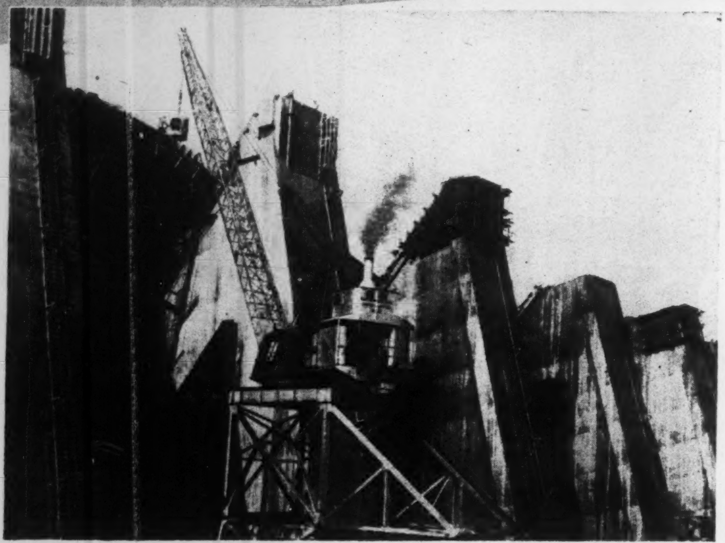
TIMBEAMS are being widely specified for buildings and other structures for the U. S. Engineers, Navy and Defense Plant Corporation. They are WPB approved.

Since TIMBEAMS are made of standard dimension lumber and standard plywood, adequate stocks of which are carried to assure prompt delivery . . . and because they are completely pre-fabricated, TIMBEAM jobs afford adherence to the shortest completion schedule.

Write for catalog.

TIMBEAM, Inc. **4086 Michigan Ave.** **Detroit, Michigan**

Ace high FOR HEAVY DAM CONSTRUCTION
The AMERICAN REVOLVER



AMERICAN REVOLVERS have proved their perfect adaptability and superior speed, accuracy and ruggedness for all operations of large dam construction:

1—Placing forms, reinforcing steel, etc.
2—Pouring Concrete.
3—Stripping Forms.

Gantries can be adapted to all sorts of ground conditions to eliminate expensive trestle construction.

Low upkeep — High Re-sale Value.
Steam — Electric — Gasoline and Diesel Power.

AMERICAN HOIST & DERRICK CO.
SAINT PAUL, MINNESOTA
CHICAGO · SAN FRANCISCO · NEW YORK
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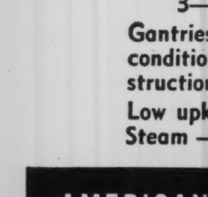
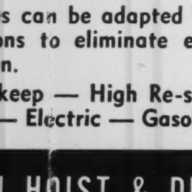
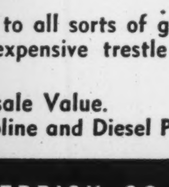
SIXTY YEARS OF SAFETY
1883 1943
The Genuine
CROSBY CLIP







Full descriptive catalog of Tri-lok Grating, Safety Treads and other products on request.

Specify
TRI-LOK
OPEN STEEL FLOORING · SAFETY STEPS
CONCRETE ARMORING T. TRI·LOK
DRAVO CORPORATION
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REPRESENTATIVES IN PRINCIPAL CITIES

MEETINGS

American Road Builders Associatio Edgewater Beach Hotel, Chicago, I May 5-7.

American Water Works Associatio annual meeting Hotel Statler, Clevelan Ohio. June 15-18.

American Wood-Preservers Associ tion, annual meeting, Palmer Hous Chicago, Ill., April 27.

Regional and Local Meetings

Pacific Northwest Section, America Water Works Association, Bellinghan Wash., May 7-8.

Montana Section, American Wate Works Association, Billings, Mont May 14-15.

Highway Conference, University o Tennessee, Ferris Hall, University Cam pus, Knoxville, Tenn., May 14-15.

Pennsylvania Sewage Works Associa tion and Pennsylvania Water Works Operators' Association, Penn Harri Hotel, Harrisburg, Pa., June 8-9.

Elections and Activities

At the joint meeting of the Texas section of the American Society of Civil Engineers and the board of direction of the parent organization, at Dallas, Tex., on April 6-8, two Fort Worth engineers received honorary awards from the American Society. They were J. H. Brillhart and William Grant. Mr. Brillhart is a graduate of Lehigh University and is president of the Fort Worth Structural Steel Co. He has designed and built many outstanding structures. Mr. Grant is a native of Nebraska and a graduate of the University of Nebraska and also completed two years of post graduate work at the Massachusetts Institute of Technology. He is associated with the firm of Freese & Nichols, consulting engineers of Fort Worth, Tex.

Paul Hansen of the engineering firm of Greeley & Hansen, Chicago, is to speak on the topic of sanitary engineering in public health in wartime at a meeting of the Illinois Public Health Association to be held in Chicago, May 14-15.

The Mid-South Section of the American Society of Civil Engineers, with J. M. Page presiding, met in the Arkansas e Highway Building, Little Rock, for spring meeting on March 26. After ring several speakers the meeting was cluded with a dinner at the Albert e Hotel.

y **Water Commissioner** Thomas J. nker of St. Louis, Mo., discussed nicipal water systems at a meeting of Engineers Club of St. Louis on rch 25. His talk was illustrated with tern slides showing some of the city's lier waterworks and present sites. He ched on the plants of the past and present plants at the Chain of Rocks the Mississippi River, Howard's Bend the Missouri River, and the pumping ions at Baden, Bissell's Point and the sanitarium. He also described the provements which will be necessary in future.

S. **Ward**, of Willmar, Minn., Kandii county engineer, has been elected sident of the Minnesota County highy engineers association. Vice-president H. C. Nickerson, of Carlton County; retary-treasurer, A. L. McKay, of ippewa County.

onard **Thompson**, St. Paul, Minn., been named president of the Minnea Federation of Engineering Societies. e first vice-president is Charles Foster Duluth; second vice-president, C. A. rrick, of Minneapolis; third vice-sident, Glen Lerch, of Hibbing. My L. Jones, of Minneapolis, treasurer.

H. **Wieters**, director of the division engineering, Iowa state department of lth, has been elected president of the s Moines Engineers' Club. C. H. Carl and Paul Winfrey have been named e-presidents; Monroe L. Patzig secrey-treasurer.

rbert **Spencer** has been re-elected esident of the Asphalt Institute, repenting most of the major petroleum d asphalt producers of the United ates and Canada. The executive comittee consists of J. A. Blood, C. W. rbour, H. B. Pullar, David Waxman d Herbert Spencer. Bernard E. Gray s been made general manager and ll also retain his position as chief enneer of the Institute.

illiam P. **Roscoe**, of Billings, has en re-elected by the Montana Conctors Association for the fifth time as esident. Other officers are J. L. Mcughlin, Great Falls, vice-president; eorge Nilson, Great Falls, secretary; d H. M. Hanson, Billings, treasurer. ther directors re-elected were: Les eridan, of Butte, and George Nilson, Billings.

Alabama Operations Show Distinctive Equipment Utility and Original Dredge Design . . . . .

Twenty-two years of continuous successful use of Amsco Dredge Pump equipment exemplifies dependable performance. The dredge engineering of today, expressing the economical management of hydraulic sand and gravel plant operations is typified by this producer, in whose equipment "fitness-of-purpose" construction is employed.

The Underwood Walker Company, of Birmingham and Prattville Junction, Alabama, seeking maximum equipment efficiency, has made a new departure in dredge boat design. In 1937 they commissioned a new 10-in. pump size, diesel engine powered plant, a design requiring minimum upkeep attention. The boat is of six steel tank pontoon construction, with all deck and cabin framing, and the engine base setting, of structural steel. The deck, cabin sides and roof are of wood. A novel type of boom assembly, built of structural steel with horizontal beam, the outer end supported by outrigger pontoons, is used for manipulating the plain suction pipe line.

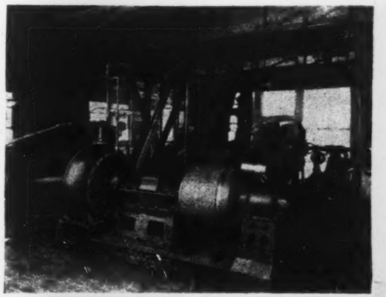
A 10″ Amsco, type "M", form 32, heavy duty dredge pump is used for production. It is belt driven by a 150 H.P., 257 R.P.M. diesel engine. The dredge operation works in conjunction with a booster pump, a duplicate of the dredging unit, located on shore conveniently near the screening plant.

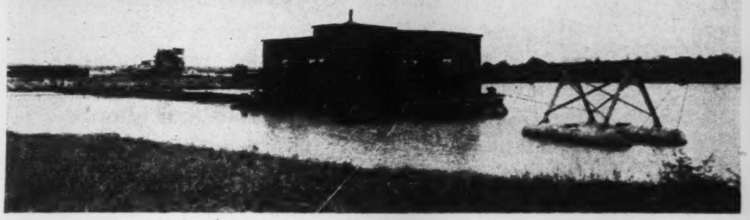
The results of many years of practical operation have shown that the entire installation is nicely balanced throughout and affords flexibility over a wide range of field conditions.

The dredge pump water end parts and all pipe line fittings are made of Amsco impact and abrasion resistant manganese steel, "the toughest steel known."

The composite outline of plant operations illustrates a clear-cut thoroughness of planning and construction; and in particular, the new dredge, under continuous operation, has proved to be most economical.

A bulletin is available completely describing Amsco Dredge Pumps, Rotary Cutters, and Pipe Line Fittings.





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Chicago Heights, Illinois

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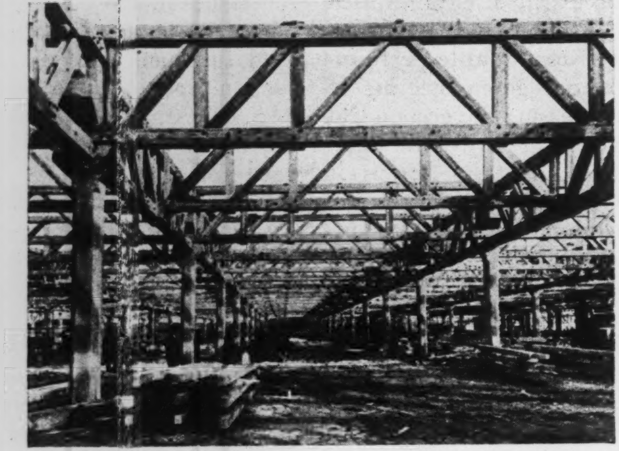
Timber Construction
FOR INDUSTRIAL PLANTS
COMES BACK!

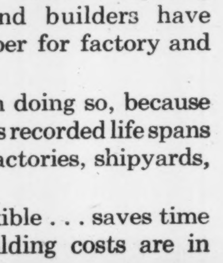


Teco Connector-built trusses in a war plant, Somewhere, South

WITH the pre-emption of steel for fighting materiel, engineers and builders have switched to lumber and timber for factory and plant construction.

They're on solid ground in doing so, because heavy timber construction has recorded life spans of 75 years in textile mills, factories, shipyards, warehouses and canneries.

Timber construction is flexible . . . saves time in fabrication. Over-all building costs are in line. With Teco ring connectors and grids, load-bearings have ample safety factors.



Arkansas Soft Pine Piece Stuff

Under improved chemical pressure treatment, timbers and laminated trusses are effectively resistant to deterioration and fire. Even untreated timbers are slow-burning, can't buckle.

Arkansas Soft Pine is supplying a large volume of material to fabricators for war projects. This species qualifies for requirements under Federal Specifications MM-L-75lb and affords dependable lumber and timbers for heavy construction. For technical data, specifications, and complete information, without obligation, address:

ARKANSAS SOFT PINE BUREAU
468 BOYLE BUILDING
LITTLE ROCK, ARKANSAS

W. P. PAYNTER, Middlesboro, Ky.,
been elected president of the Kentuc
Association of Highway Contractors.
E. Wells, Carrollton, was chosen f
vice-president, and W. E. Lehman, L
ington, second vice-president. W.
Humble, Frankfort, was re-named exe
tive secretary.

LLOYD A. CHACEY, Columbus, Oh
has been elected president of the Fra
lin County Chapter of Professional En
neers. He has announced the appointme
of A. P. Harness as chairman of t
violations committee; Frank Shelton
the publications committee; and Pa
A. Uhlman chairman of the professio
practices committee.

T. C. KIRKMAN, director of public wo
for the city of High Point, N.
has been elected to membership in t
American Public Works Association.

HIGHWAY CONSTRUCTION in the war eff
and the postwar program will ho
the spotlight at the business conferen
of the American Road Builders Associ
tion in Chicago, May 5-7. This conf
ence will replace the annual ARB
convention and road show, which h
been cancelled on account of war cond
tions. Some of the current problems
be considered at this streamlined me
ing are: utilization of constructi
equipment; manufacture and distrib
tion of repair parts; the potential co
struction program for 1943 highw
maintenance; federal assistance for t
rehabilitation of war-torn highway
manpower; renegotiation of contract
price regulation; restrictions on mot
transport, and changes in federal poli
relating to construction.

WITH INDUSTRIAL postwar planning
its theme, the annual meeting of t
engineering and technical societies
the Southern Tier will be held April
at the Arlington Hotel, Binghamto
N. Y. Among the participating grou
will be the American Society of Ci
Engineers.

AT THE ANNUAL MEETING of the Ka
sas City Chapter, Associated Gener
Contractors of America, held in Kans
City, Mo., the members heard a numb
of important speakers, including H.
Foreman, managing director, and Osc
B. Coblentz, president-elect, of the N
tional Association of the A.G.C.; C
R. E. M. Des Islets, district engine
Corps of Engineers, of Kansas City, a
H. W. Richardson, Western editor
Engineering News-Record. Mr. Forem
and Mr. Coblentz spoke on the subj
of "Washington Influences," and the a
tivities of the association nationally. C
Des Islets extended greetings to the c

ors and expressed generally the faction he had had with the A.G.C. ractors. H. W. Richardson spoke on onstruction of the Alcan Highway, ing about 60 slides, pictures taken imself in his coverage of the job for neering News-Record. J. E. Dunn installed as president of the Chap- Other officers are as follows: Lysle Weeks, first vice-president; Carl T. ch, treasurer, and Harry G. Palmer, tive secretary.

NE Dupuis, C.E., is the new elected man of the Quebec branch of the neering Institute of Canada. Mr. is began his engineering education cGill University, Montreal, and com- d his course at Nancy, France. Re- ng to Canada, Mr. Dupuis was em- ed for two years by the Canadian inghouse Co., Hamilton, Ont., and that time has been closely con- d with water and power company ities in the Dominion.

TY Engineer John A. Shisler has elected president of the city zoning d of appeals at Canton, Ohio. Ralph has been re-elected secretary. L. W. Cooper is the third member, with ing inspector Lloyd A. Davis as en- ement officer.

O. Griffin has been elected secre- of the Construction Section of the onal Safety Council.

Y R. Marston has been elected dent of the Ontario Good Roads ciation. J. N. Allan was elected first president and P. A. Wagner second president.

FFICERS of the Arkansas Chapter of Associated General Contractors of rica were elected recently as fol- : R. T. Higgins, president, and H. L. inson and William Peterson, vice- idents.

J. Klippen was re-elected president he Duluth Contractors Association for fourth consecutive term recently. r officers are Edwin A. Willner, first president; G. A. W. Hedenberg, sec- vice-president; J. D. Harrold, treas- ; and L. R. Avoy, secretary.

rthur L. Clark, dean of applied nce and engineering at Queen's Uni- ity, Kingston, Ont., will retire at the of the present university session after inuous service as dean since 1919. Clark is a graduate of Clark Uni- ity and is a member of the National earch Council in Canada, and one he very few honorary members of Engineering Institute of Canada.

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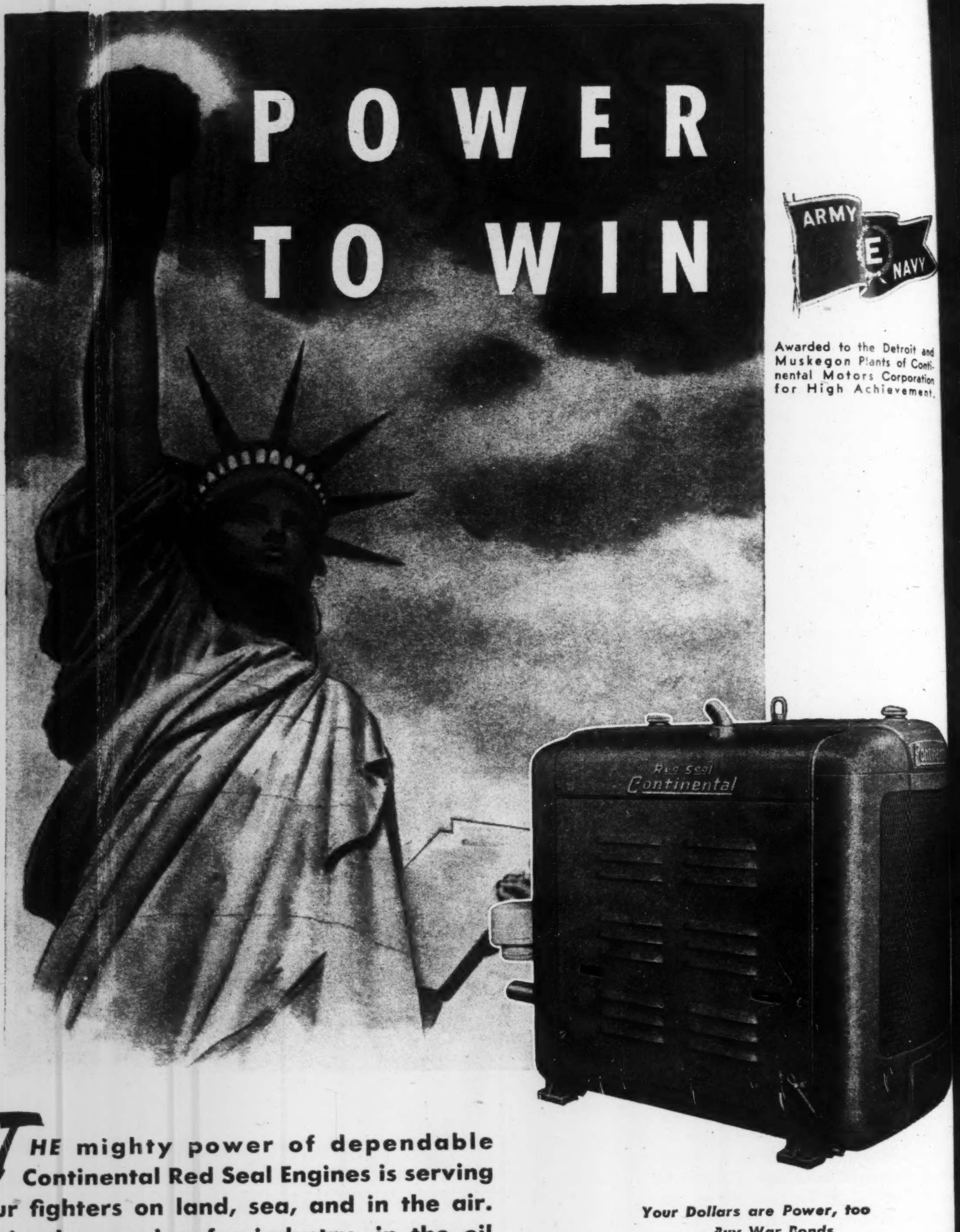

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